M Y 7, 1951

STEEL

The Weekly Magazine of Metalworking

OF MICHIGAN
MAY 7 1951
EAST ENGINEERING
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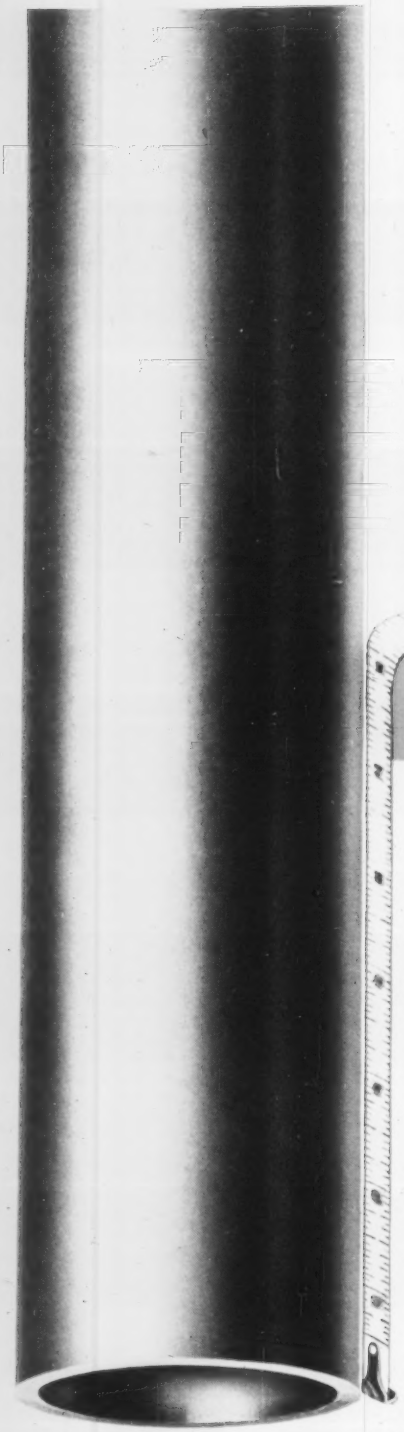
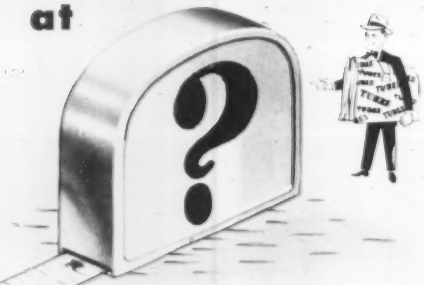
High Compression Engines Mirror Motordom's Progress

—page 101

Fewer Grinding Wheel Breaks through Correct Mounting, p. 122
Three 'If's' in Scrap: Men, Prices and Freight Cars, p. 89
Use the Right Forming Lubricant, p. 116



Let's take a Closer Look at



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B&W SEAMLESS and WELDED TUBES

TA-1630-M

STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 19 MAY 7, 1951

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***Next Week*... Screw Machine Products: A Bellwether of Metalworking... Investment Casting Conserves Critical Materials... Beryllium Copper Fills Varied Defense Needs... Models Aid Factory Layout Planning**

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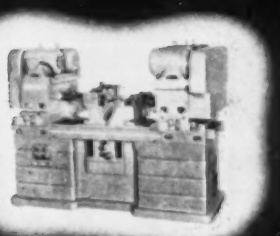
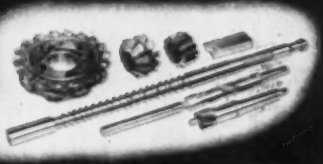
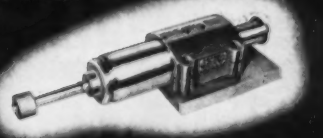
EX-CELL-O for PRECISION



PRECISION MACHINE TOOLS

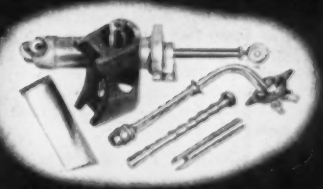


CONTINENTAL CUTTING TOOLS

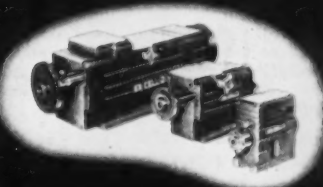


PRECISION GRINDING SPINDLES

DRILL JIG BUSHINGS



AIRCRAFT AND PRECISION PARTS



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Behind the Scenes . . .

Backyard Retreat

Do you want a railroad caboose in your backyard? Robert Whittington Kincey did; what's more, he got it as the accompanying photograph testifies. Bob has been STEEL correspondent for the Birmingham area since 1937 and is business editor of the *Birmingham News*.

When the idea for a caboose retreat crystalized, he posed the problem to E. C. Patton, local representative of Louisville & Nashville Railroad. A

few days later, Patton delivered "Old 352" to Kincey's backyard—instead of the junk yard. Other railmen helped furnish the caboose. Fred O. Reemer, vice president of Pullman-Standard, sent two mattresses; Wayne Johnston, Illinois Central chief, got the caboose mounted. Clark Hungerford, Frisco president, sent two Pullman lounge chairs and had installed a kitchen cabinet with marbleized top and sink and a complete bathroom with stainless steel shower, commode and hand basin as used on trains. Other railmen sent lamps, ash trays, demitasse cups and pictures.

Bob now has a pine-paneled retreat where he can entertain friends. All the railroad presidents have sent autographed pictures, and visitors have included everybody from labor leaders to bankers and Chamber of Commerce people. The only objector is Mrs. Kincey: "A petunia bed would look better."

Beside railroads, Bob has another hobby, the circus. That interest started when he was a boy in Selma, Ala., where his father owned a weekly newspaper. Bob got to know the circus press agents, including Dexter Fellows, the dean of them all. When Fellows died, Mrs. Fellows sent Bob his watch.

Bob's annual vacation is to Sarasota, Fla., winter quarters of the Ringling circus. He has ridden from Sarasota aboard the show train to New York 14 times. He knows Johnny and Buddy North, president and vice president of Ringling, many of the clowns and animal trainers. He was once given a lion cub that later died after being injured in trying to escape.

In Birmingham Bob is known as the Ringling representative without portfolio. His circus stories in the *News* have won wide acclaim.

Misunderstanding

You may have noticed that Geraldine, a cleaning woman in our building and our erstwhile night editor, has not appeared in these columns for some time. Alas, there has been a misunderstanding. It came about in this manner:

Some time ago we were engaged in an extracurricular activity that involved a mock political campaign. We called upon our art department to make a sign. Pat Dwyer Jr. came up with a handsome one that read "Sweep Clean with Richards." Richards was our candidate. The sign was made a day or two in advance, so we had it around the office for a while. Geraldine saw it, misinterpreted it as an elaborate slur on her cleaning performance and hasn't spoken to us since.

We miss her.

Bee on the Bee

Bausch & Lomb Optical Co. reports it has developed an instrument that puts the bee on the bee. It is a handsized honey refractometer that determines in a few seconds the moisture content of honey.

Alas, poor bee! It too must submit to tighter controls, as we all must in this restrictive age.

Puzzle Corner

Paul C. Smedley of Ohio Crankshaft Co. was the first in with an answer to the cow and rope problem in the Apr. 23 issue. The cow had a 100-foot rope.

Herman Balsam submits this puzzle as a favorite of the late William Lyon Phelps, professor at Yale University. In 15 minutes without reference, write down 10 words ending in "uous". When Professor Phelps tried that one on such guests as William Howard Taft, Theodore Roosevelt and Charles M. Schwab, the average score was 8, without using a dictionary.

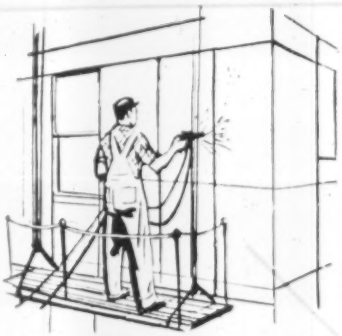
Shrdlu

(Metalworking Outlook—Page 79)

WE LIVE—

WE BREATHE—

WE THINK—



Gilsonite Insul-Mastic—The only mastic coating ever approved under original U. S. specifications for the preservation of bombers and war materiel. Moisture vapor transmission rate of only .01 grams per 24 hours per 100 square inches per 1/8" thickness by actual government test.

Insul-Mastic Type "D"—Sprayed insulation. Adheres at any angle. Stops 65% of heat loss. Water repellent.

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VAPOR SEALING
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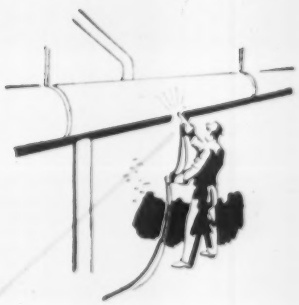
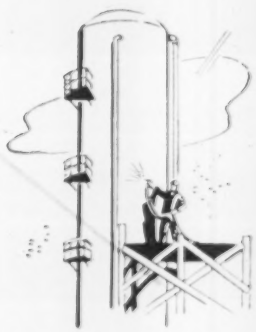
Insul-Mastic coatings are homogenized. The solvents do not separate. The smooth homogenized texture throughout assures you of easy pumping and definitely helps sprayman to avoid blobs and pinholes.



Insul-Mastic Vinyl System—Flexible for use over rigid and semi-rigid insulation. Provides a tough resilient moisture barrier to protect thermal insulation. Eliminates use of chicken wire and asbestos cement.



Gilsonite Insul-Mastic—Highly resistant to acids, alkalis, moisture and wear. Exceptionally long life.

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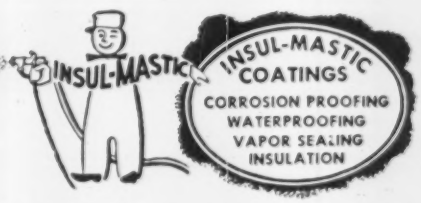
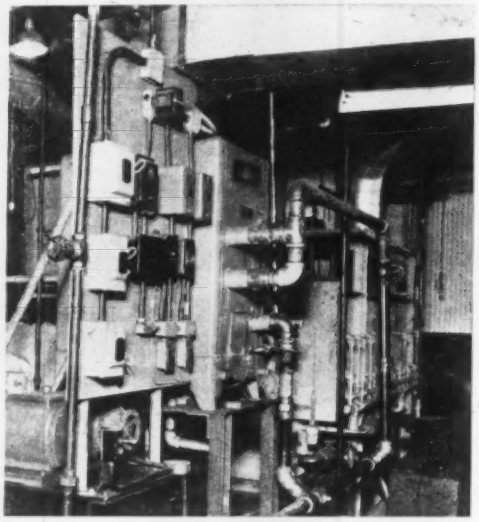


Improve Quenching and You Get Better Heat Treating

Your Department can have a better arrangement with Niagara Equipment that saves much space and increases your production.

This quench bath cooler gives you control of temperature and pays for itself quickly with water savings



● The NIAGARA AERO HEAT EXCHANGER transfers the heat from the quench bath to atmospheric air by evaporative cooling. It never fails to remove the heat at the rate of input, giving you real control of the quench bath temperature. This prevents flashing of oil quenches. In all cases it improves physical properties, saves loss of your product from rejections and gives you faster production, increasing your heat treating capacity. You can put heat back into the quench bath to save the losses of a "warm-up" period.

Savings in piping, pumping and power as well as great savings in cooling water return the cost of the equipment to you in a short time. The Niagara Aero Heat Exchanger saves nearly all of the water consumed by conventional cooling methods.

For the complete story of other benefits and savings, write for Bulletin 96.

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LETTERS
TO THE EDITORS

The Curtain Is Drawn

While stationed with the U. S. Military Attache in Prague, Czechoslovakia, I met a strongly pro-American metallurgical engineer who now requests pamphlets on "Geometric Pass" in seamless steel tubing. He gave STEEL as source for this information.

Since I am not informed on the data requested, please tell me if it is of a classified nature, for although this Czech's views are sympathetic, I will send no information which might be helpful to the communist government.

Capt. Richard S. Steffel, USAF
Falls Church, Va.

● *No technical information has been sent by STEEL to countries behind the Iron Curtain since outbreak of the war in Korea.*

LPG: Exceptions Are Heard

We take exception to the statement in the article "Refinery Waste Moves Into the Big Time" (STEEL, Feb. 5, p. 57) that "Big shots in the LPG industry are Phillips Petroleum Co. and Warren Petroleum Corp."

W. A. Baden, president
Anchor Petroleum Co.
Tulsa, Okla.

Your statement would lead purchasers to believe these are the only two producing companies in the LPG business and places other suppliers in a very unfavorable position. A more persistent research on your part would indicate Phillips and Warren represent only a small per cent of total LPG production.

H. W. Manley, vice president
Sunray Oil Corp.
Tulsa, Okla.

● *We said: "Big shots in the LPG industry are Phillips Petroleum Co. and Warren Petroleum Corp., although there are about 130 producers in all, of which some 50 might be classed as good-sized. We could not list all 130 suppliers and there is little question that these two have long occupied dominant positions in the field, just as General Motors, Ford and Chrysler are the "Big Three" of the automotive industry.*

Soil Pipe: A New Standard

STEEL reports the Cast Iron Soil Pipe Institute advanced specifications for a new product to be called Service Weight pipe (Apr. 2, p. 118). Can you send me the Institute address?

Herbert A. Newbury
Talladega, Ala.

● *490 Bleeker Ave., Mamaroneck, N. Y.*

The Metalworking Outlook

What Defense Will Do to Industry

How will metalworking fare compared with other industries in the next eight or ten years of a garrison economy? A study of the Census of Manufactures figures for 1939 and 1947 reveals that in that war period the expansion in real value added by manufacture averaged 100.3 per cent in metalworking but only 65.2 per cent in other industries. Value added by manufacture is indicative of increased mechanization and efficiency. The metalworking groups that showed the greatest gains include engines and turbines, 209.2 per cent; electrical appliances, 208.7 per cent; aircraft and parts, 185.9 per cent; and communications equipment, 183.0 per cent. Will history repeat?

War Contracts: Not Enough Data

Complaints are increasing in industry that the government is giving insufficient information when it is negotiating to let a defense contract. Particularly inadequate are the quality control specifications which are sometimes not available until the contractor is nearly ready to start production on the job. Rather than lose a good armament order, most companies will accept a contract even if it has insufficient quality control specifications. They trust to luck that the requirements will be what they estimate. If the needs are higher than expected, the contractors' costs may be substantially increased.

U.S. Shifts Inspection Emphasis

Watch for less and less government inspection of the production done by defense subcontractors. Some will continue, but the services are trying to simplify their procedures and will concentrate on inspection of the end products turned out by the primes. Since the primes are responsible, they from now on are going to be more particular about inspection and control procedures among their suppliers.

A Matter of Records

With controls steadily increasing, good records—particularly consumption data—are more important than ever. To set up a good system: Keep all purchase orders, verbal or otherwise; be sure that all purchase orders carry priority rating and authority for the rating; keep a receiving report on everything arriving at the plant; see that purchase and receiving orders and invoices are kept as long as a lawyer recommends; keep a materials certification slip attached to all purchase orders.

Compulsory Union Membership?

The new Wage Stabilization Board is likely to order compulsory union membership in some form. That's what happened in World War II, and history may repeat. Then, there was a maintenance-of-membership formula. That may not result this time when the modified union shop like the General Motors plan may get approval. WSB will be lenient, too, in granting wage increases. The tipoff: In a speech before the U.S. Chamber of Commerce, Assistant Price Director Edward F. Phelps

Production Engineering News—p. 115 The Market Outlook—p. 181

Jr. said that "only" 2 million workers have received the wage increase allowed by the present wage control formula.

Washington Gets Fingers Burned

Because of a Supreme Court decision last Monday, the government may be more reluctant from now on to seize struck industries. The tribunal ruled in the case of Peewee Coal Co. that the government was liable for losses incurred when it took over in 1943 after Mr. Lewis' miners walked out. The government estimates that more than $10 million is involved in similar suits by midwestern motor carriers seized by the U. S. in 1944 and even more millions may have to be paid to other coal companies taken over.

Needed: Better Salvaging

Look for government pressure for better salvaging in industry, if natural economic incentives don't turn the trick. Most World War II salvage programs are pretty well rusted, especially among small and medium-sized plants. If it has to, Washington will push salvaging via patriotic appeals and pressure on those companies with defense contracts.

All About CMP

If your product does not come under the Controlled Materials Plan and you think you have a good case proving that it should be included, take the matter to your industry division of NPA . . . You can make both A and B products under CMP at the same time . . . As it looks now, a priority system similar to the DO setup will apply to non-CMP materials that are tight . . . CMP officials will go slow about answering industry's questions until after their information teams have finished schedules, late in May. Then the questions found to be asked the most frequently will be answered in detail.

Signs of the Times

Of the 18,857,000 war veterans now living, 15,222,000 are of World War II . . . States with the largest gross personal incomes are New York, California, Illinois, Pennsylvania and Ohio in that order; the state with the lowest gross personal income is Nevada . . . Fresh water is becoming a progressively more serious problem; Housing & Home Finance Agency is starting to step in with loans for water projects.

Here and There in Industry

Hazelton Steel & Tubing Corp., Hazelton, Pa., got a $7.8 million government loan for an electric furnace steel plant . . . Porcelain Enamel Institute, Washington, is studying the possibility of converting facilities to defense subcontract work not necessarily related to usual enamel processes . . . More complete allocation of tungsten is likely through an amendment to NPA Order M-30 . . . "Operation Small Business," the designation given an Air Force prime contractors' exhibit being held at Navy Pier, Chicago, is attracting well over 1000 small business representatives a day. Midcentral Air Procurement District Office of the Air Materiel Command is staging the clinic which will last through May 9.

Who Is Out of Step?

Atmosphere of spring conventions this year is reminiscent of post Pearl Harbor days. Much of the discussion revolves around the status of the convention members' industry in the graces of Washington officialdom.

There is a marked difference in the rating of industries on this score. Two weeks ago at Buffalo, members of the American Foundrymen's Society were cheered by assurances that today Washington recognizes the castings industry as basic, whereas in World War II foundrymen labored under the handicap that Washington did not appreciate the importance of their industry.

Last week in Chicago members of the American Steel Warehouse Association appraised their rating in Washington. Whatever complaints they voiced were softened by the fact that in 1950 shipments to warehouses were greater than in any previous year.

Also convening in Chicago last week were members of the National Machine Tool Builders' Association. Their attitude toward Washington officialdom was critical to the extreme. President Richard E. LeBlond summed it up bluntly when he said the current situation is "one of complete chaos and confusion and the outlook for tomorrow is utterly unpredictable."

The situation of machine tool builders is the exact opposite of that of foundrymen. In World War II machine tool companies enjoyed a co-operative relationship with War Production Board. Today they say they are being given a consistent brush-off. Statistics support their claim. At no time during World War II did the backlog of machine tool orders exceed 12 months of production. Today the backlog is 18 months and many orders are yet to be placed.

Before Pearl Harbor, machine tool builders were turning out 110,000 units annually. In 1951 they will work hard to exceed 56,400. Already complaints of slow delivery are emanating from defense contractors. Unless prompt action is taken to relieve the industry of present handicaps, there will be an embarrassing slowdown of defense production.

One wonders why government officials are so blind to the importance of machine tools in 1951 when they were so acutely aware of it in 1940 and 1941. Definitely there is something wrong in Washington's attitude. It calls for immediate clarification and correction.

E. C. Shaner

EDITOR-IN-CHIEF

DANGEROUS LETTERS: At the 42nd annual meeting of the American Steel Warehouse Association in Chicago last week President Walter S. Doxsey issued a timely warning against the practice by some steel buyers of complaining to Washington when they think they are not getting enough steel. He says that while the letters cannot make more steel available they do provide ammunition for persons who would like to put the government into the steel business.

"I think our 700 member warehouses with

7000 salesmen reaching a half-million customers should join the battle in defense of the steel industry . . . Men who would like to make planned production permanent just love to have you tell your customers you can't fill their orders. They couldn't ask for more effective and insidious propaganda for their cause than to have you sow such seeds of discontent . . . Don't do it! Don't be a sucker!" —p. 87

SCRAP WILL BE TIGHT: Robert W. Wolcott, chairman of the Committee on Iron & Steel Scrap for the American Iron & Steel Institute, reports that at plants of 11 major steel companies scrap inventories have declined from an average of over 50 days' to an average of 21 days' supply in a period of about three months. Normally steelmakers like to have several months' supply for most efficient operation.

This decline in scrap inventories coupled with other indications is causing some apprehension as to whether enough scrap can be found to support the operation of expanding steelworks and foundries during the next two years. While admitting it is a nip-and-tuck proposition, E. C. Barringer, executive vice president of the Institute of Scrap Iron & Steel Inc., says the job can be done provided the scrap industry is permitted to retain its manpower, allowed fair prices and assured of sufficient open-top cars. —p. 89

INGENUITY PAYS OFF: Resourcefulness always has been an important factor in maintaining the reputation of American industry for getting things done in a hurry. This trait is being illustrated at the Cadillac tank plant at Cleveland where all sorts of short cuts are being devised to save time and money.

Finish-machining 84-inch diameter turret openings in cast armor steel tops of light tanks presented a stiff problem. The obvious solution was to install a 28 or 30-foot vertical boring mill such as used in a few other tank arsenals. This machine would cost $300,000 and would take 12 months or more to build. Cadillac had to be machining turret openings within seven months if it were to meet its production target.

Process engineers came through with a clever idea. They bought a standard 12-foot boring mill and revamped it with special end columns and cross rail providing a 24-foot opening between columns. The improvised machine was delivered in 5½ months and at a substantial saving to taxpayers. —p. 98

HOW TO SAVE MONEY: Success of the Fourth National Materials Handling Exposition and the Material Handling Conference in Chicago last week reflects the tremendous growth of interest in materials handling in recent years. Equipment displayed at the International Amphitheatre was valued at about $10 million and more than 25,000 persons came to see it.

Major reasons for the marked attention now being devoted to materials handling are, first, that movement of materials is a problem common to practically every type and size of industrial operation and, secondly, with current inflated costs efficient handling constitutes one of the most positive ways of saving time and money. Management of any company that has not checked its materials handling methods recently is overlooking an almost certain opportunity to effect economies. The Chicago show was an eye-opener as to what can be done with modern facilities. —p. 91

ANALYZING TOP GAS: In 1946, engineers of Arthur D. Little Inc. were requested by officials of Republic Steel Corp. to investigate the potentialities of continuous analysis of blast furnace top gas. After initial experiments a gas analyzer of the thermal conductivity type was selected with which tests were conducted until it was possible to derive correlations based on gas equilibria that would give advance indications of the heating and cooling cycles of the stack with a high degree of accuracy.

The next problem was to integrate this procedure into the routine operation of a furnace. It has been adopted in the operation of Republic's No. 5 blast furnace in Cleveland. It has proved invaluable in providing a direct interpretation of changing gas equilibria at all times and in giving immediate warning of cut tuyeres, cooling plates or other failures which would introduce water directly into the furnace. —p. 136

What To Do About Steel Shortage

The stark, cruel fact is that you can't do much about it until more steel capacity comes in late in 1952. But here are ways to make the best of it

THEY don't make steel in Washington.

Steel buyers seem to be forgetting that, says Walter S. Doxsey, president of American Steel Warehouse Association Inc. In talking before a meeting of the association in Chicago last week on what to do about the steel shortage, he gave advice to warehousemen—who serve 500,000 small steel consumers—that applies to any user of the metal.

Five Things To Remember — The advice is this:

Take individual hardship problems to your steel supplier, not to Washington. They don't make steel in Washington; your private difficulty probably will not be relieved by NPA officials nor will your complaint raise steel production one pound.

Take problems of an industry-wide nature to your trade association. In most cases those groups carry more weight than individual companies, and government officials appreciate hearing the case just once from the association rather than many times from individual companies.

If you write or go personally to Washington, remember that complaining letters will be kept, that complaining interviews will be duly recorded. They may be used at some time as proof that industry should be nationalized.

Remember that the overwhelming majority of the personnel in the NPA are public spirited, capable individuals who have a terrifically difficult assignment. There have been mistakes, but Mr. Doxsey believes that, on the whole, the steel distribution job has been fairly well done.

Don't blame and condemn steel suppliers—both mill and warehouse—for conditions they'd like to change but can't. Remember that a record 72,232,292 tons of finished steel was turned out in 1950 and that a record 18.9 per cent of that—more than 13 million tons—was distributed to half a million users through 28,000 warehouse distributors. In the past 25 years shipments to warehouses have quadrupled, and the percentage of total steel production delivered to warehouses has nearly doubled.

Make the Best of It—Mr. Doxsey warns that the steel shortage may continue well into 1952. There's little chance of relieving it before then, so we might as well make the best of the situation. He thinks it's miraculous that the steel industry has done as well as it has, because to maintain efficient production schedules under today's stresses and strains "is like trying to do a jig saw puzzle in a concrete mixer." The warehouse association executive does criticize the steel producers for not insisting that their district managers and salesmen be competently instructed about government regulations. On this matter, he says, "on all sides there have been too many off-the-cuff interpretations and opinions."

He chides warehousemen for being too impatient about steel allocations: "In many respects, warehouses are the most favored of all mill customers under these NPA regulations." He said in 1949 and he repeats now: "It's easier to get steel when it's scarce than it is to sell it when it's plentiful."

Below Normal — An association check reveals that warehouse inventories are now only 40 per cent of what they were Sept. 1, 1949. "Many warehouses," says Mr. Doxsey, "look like roller skating rinks at 1 a.m. after everyone has left except the janitor. The stark, cruel fact is that warehouses will just have to operate without inventories until supply catches up with demand. For a while warehousemen will just be delivery boys passing steel along to customers."

Machine Tool Headaches

CMP, presumably, will alleviate the materials headache. Prices, men, distribution will linger

"IS THIS a defense program or isn't it?"

That was the question posed by Richard E. LeBlond, president of R. K. LeBlond Machine Tool Co. and National Machine Tool Builders' Association, at its spring meeting in Chicago last week. Consensus of industry speakers at the convention is: Dilatory defense policies by top government officials are largely responsible for the quandries machine tool builders now face.

Four Headaches — The industry has four major problems: Materials; prices, manpower and fair distribution of its production. The Controlled Materials Plan, presumably, will solve many materials difficulties, but the others still remain. M. A. Hollengreen, president of Landis Tool Co. and chairman of NMTBA's Government Relations Committee, says that price regulations "plunge the machine tool builder back into an obsolete cost-price ratio which guarantees substantial losses."

The industry's manpower is so tight now because much of the industry's force had to be let out during the

UNERRING: Precision master gages used to check accuracy of production line gages are examined by tool room supervisors of General Electric's turbine division. Weighing about a pound, these masters are worth over $10,000. They form a vital part of accuracy control in production of nozzles for steam turbines

lean years immediately after World War II and now the builders can't compete in the labor market with more prosperous industries. The pool order system would seem to contribute to fair distribution of machine tools, but the pool "is widely misunderstood," says Mr. Hollengreen. "Even Jess Larson, Administrator of General Service Administration which handles the program, doesn't understand it."

Mr. Larson in a news release once said that pool contracts will result in a pool or reserve of machine tools that can be drawn on by contractors when they need the units instead of waiting for the machine to be built. That is not true. A pool order is simply an underwriting of a certain number of machines by the government. As the defense tool orders come to GSA, they are pooled, given priority ratings and placed with the builder in lots so that he may have help in financing the jobs and priority aid in getting materials for the contract. As before, a company that orders a machine tool and gets in the pool will still have to wait months for delivery.

Two Years Ahead—The industry now has a backlog of unfilled orders equivalent to 18 months' production at the present rate of output. Practically all of that backlog is for defense. According to present indications, 1951 output probably will not exceed 56,400 machines. That's less than one-third of what was produced in 1941—185,000 units; and until the end of that year, the U.S. was not actually in war.

On Jan. 7, 1941, when the National Defense Program preceding World War II was crystallized, the machine tool industry was producing at the rate of about 110,000 units a year. Last July, when the United Nations forces went into Korea, the builders were producing at the rate of about 34,600 machines per year. Machine tool builders say those figures prove we are in a bad way as to the machines that make defense production possible. But Washington offers little specific help. Say toolmen: "No wonder we ask: Is the U. S. really embarked upon a defense program?"

Automakers Pinched for Tools

In tooling up for war materiel production, automakers are having only limited success in obtaining the machine tools they need. The experience of one company with a large jet engine contract is typical.

Requirements of the job include 1100 tools of one type. The machine tool builders' capacity for this item is slightly more than 400 a year. Consequently the company has been running down suitable used machinery. Government policy, however, is against purchase of used tools with public funds, and it took top-level action to approve the purchase of these for the job.

The government's attitude reflects a distrust of industry's judgment in the matter of spending money for production tools. And this hurts because the auto industry has shown one of its greatest fortes to be ability to make shrewd purchases of machinery for a given job. Its outstanding performance, both cost and production-wise, in the last war appears to have been almost forgotten.

The terrific load on machine tool builders has generated resentment in some government circles against the plans of automakers to carry out their 1952 model changes, which will be the most comprehensive since the first postwar revisions. But many of the machines, dies and other tooling are much too far along to allow the automakers to change their minds.

Much special-purpose engine machinery is beyond recall and should be ready for installation in the next two or three months. Body dies are out of the specialized foundries and in die shops. Some machinery has been diverted to defense plants.

"B" Product List Issued

Products placed on the Class B list of the coming Controlled Materials Plan are shown in a 24-page booklet entitled "Official CMP Class B Product List" and issued last week by the National Production Authority. More than 4000 manufactured articles containing steel, copper or aluminum are in the list.

Class B products are, in general, civilian-type goods, industrial machinery and equipment and components needed for defense. Producers on the "B" list will obtain their authorizations and allotments from their NPA industry division.

There's one other group of products, those on the "A" list. Producers of "A" products get their production authorizations and materials allotments from their customer. A prime contractor's customer is a government agency. A subcontractor's customer is a prime contractor or another subcontractor.

The Class B product list shows "B" products under category headings and indicates the particular NPA industry division to which manufacturers of each should apply for authorized production schedules, allotments of controlled materials (steel, copper and aluminum), and defense (DO) ratings.

Applications for controlled materials needed for production of "B" list items during the third quarter of this year must be received by NPA not later than May 31.

An alphabetical listing of from 12,000 to 13,000 products and materials required in all types of production will be published soon, NPA says. This list will be coded to enable producers and consumers to identify the NPA industry division or other government agency having jurisdiction over output of each item listed.

There'll Be Enough Scrap

Scrap men say they can do the job—if they get co-operation on manpower, prices, cars

RUGGED doing will be necessary to supply the record-breaking quantities of iron and steel scrap that will be required to keep the expanding steel and foundry industries going at full capacity over the next two years.

But the job can be done, says E. C. Barringer, executive vice president, Institute of Scrap Iron and Steel Inc., provided the scrap industry is permitted to retain its manpower, allowed prices high enough to encourage all scrap to be brought to market, and assured at all times of an adequate supply of open-top cars.

Fair Outlook—"The supply of scrap, as of all basic commodities, is tight," Mr. Barringer told STEEL. "But there is no real shortage, judging from the current record-making output of steel and castings. Current fears result from the fact that inventories are uncomfortably low; in some extreme cases consumers have been operating with half a day's supply. Loss of production due to lack of scrap has been negligible. With a continuation of the present allocation system, and if the scrap industry is provided with necessary labor and open-top cars and is able to obtain and pay adequate prices, there should be no loss of production at any time in the next two years due to scrap shortages."

Not so optimistic about the matter is the iron and steel industry. Robert W. Wolcott, chairman of Lukens Steel Co. and of the Committee on Iron & Steel Scrap for American Iron & Steel Institute, says that at plants of 11 major steel companies scrap inventories have declined from an average of over 50 days' to an average of 21 days' supply in a period of about three months. Normally many steel plants feel it necessary to maintain several months' supply for most efficient operation. One steelmaking furnace was idle in late April for lack of scrap, says the institute.

To Market, To Market—Scrap so far in 1951 has been flowing to market at an annual rate of about 31 million gross tons. That rate will have to be increased gradually until early in 1953 when, to produce at an annual rate of 118 net million tons of steel ingots and 20 million net tons of castings, scrap will be required at an annual rate of about 35.5 million gross tons.

Where will the additional 4.5 million tons come from? About one-third of it, says Mr. Barringer, will come from an increase in the supply of industrial scrap which automatically will accompany increased steel production. A substantial part will come from auto wreckers whose stocks of old cars are greater than ever before in history. About 400,000 tons will come from the first batch of ship breaking contracts soon to be let by the High Commissioner of the Territory of the Pacific Islands at Honolulu—with more to follow. It is reasonable to expect that a substantial part of our idle fleet of 1500 slow, small Liberty ships will be sold for breaking as large, fast new cargo ships come from the yards. Dealers can be expected to generate more scrap from farms and miscellaneous sources.

Early Ore Movement Helps—Another factor, says Mr. Barringer, is the opening of navigation on the Great Lakes at an earlier date than usual this year, making it unlikely that scrap will be called on to supply a deficit in metallics that might result from an insufficient iron ore movement in a short navigation season.

New trade customs have created some problems for the scrap industry, the scrap institute executive believes. New bessemer converters, which use only pig iron, subtract from the pig iron available to other types of melting establishments. There has been a great increase in the number of electric furnaces which melt only scrap. Steel mills produce less home scrap due to closer cropping of ingots.

Complications: Price Differentials—With foundry steel bringing $2 and $4 premiums over No. 1 heavy melting steel, a lot of steel scrap has been diverted from the steel plants to the foundries. Billet and bloom crops that formerly went to the steel casting plants now are going in large volume to electric furnace plants.

While those changes in the distribution pattern create troublesome problems, says Mr. Barringer, they do not affect the total supply of metallics available in the form of scrap. The main fact is that the scrap industry is thoroughly informed as to the needs for scrap both currently and over the next two years. Given the necessary co-operation the industry is confident of its ability to do the job.

Blueprint for Production

We can make productivity strides through better human relations, steel engineers told

"IF WE can solve the problems of human relations in industrial production, we can make as much progress toward better living in this country during the next ten years as we have made during the past 25 through the development of the machinery of mass production."

That was said by Henry Ford II and quoted by Richard E. Roberts, manager of employee relations for Ford Motor Co., speaking before the annual spring conference of Association of Iron & Steel Engineers' Rolling Mill Committee in Detroit last week.

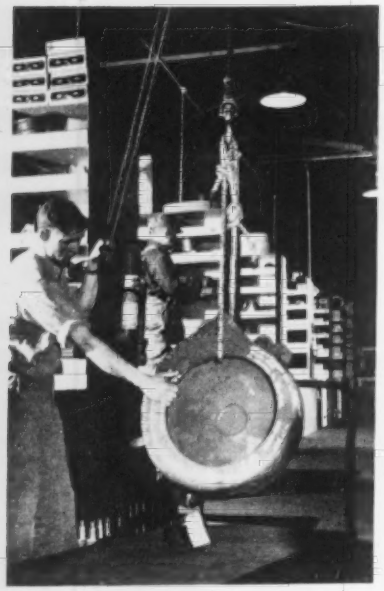
Do-Gooders?—Human relations, says the speaker, is not visionary do-goodism. It is not a plan to present employees, in paternalistic fashion, with a "heaven here on earth." It is a hard-headed realistic, business-like point of view and should be presented as such.

An enlightened human engineering program will pay the company off in happier and more productive em-

NEA

HITLER'S 2500-TON STEAM YACHT, *GRILLE*, HEADS FOR SCRAP HEAP

. . . about 400,000 tons of scrap will come from ship-breaking



NEW WAREHOUSE AT BENSON
. . . J&L streamlines processing

ployees, Mr. Roberts believes. Machines are important in production, he says, but far less so than men.

The Technical Side—The equipment phase of steel production was discussed in 15 technical papers presented at the meeting which dealt with rolling mill, mechanical and electrical problems. About 700 engineers attended.

Machinery Employment Up

Employment in the metalworking machinery industry has moved up to the highest level in four years—274,600 in February, says the U. S. Labor Department's Bureau of Employment Security.

Surveys of 248 establishments representing more than 50 per cent of the industry showed an overall rise in employment of 36 per cent between January, 1950, and January, 1951.

They Have the Answers on NPA

Answers to questions about the Controlled Materials Plan are the principal responsibility of a new Division in the National Production Authority, Washington. It is entitled the Education, Inquiry & Procedures Division. Its director is John F. Stillman who comes from the Owens-Corning Fiberglas Corp., Toledo, O., and before that from Republic Steel Corp., Cleveland. Assistant director is Courtney Johnson, General Motors Corp. Both are located in 5006 Commerce Bldg. and can be reached on STerling 9200, Extension 4705.

J&L's Benson Mines Pays Off

The world's largest open quarry mine for magnetite iron ore passed the 1 million gross ton mark last year. Jones & Laughlin Steel Corp.'s Benson Mines in the Adirondacks of northern New York set this mark in its seventh full year of production.

Progress in mining techniques and processing efficiency is a chief factor in the record output, says J&L. It has made steady additions to the mining and processing equipment during the last seven years.

The attention paid to Benson points up the importance of the mine in J&L's operations. Ground has already been broken there for construction of a new concentrating plant and a new sintering plant. These, together with other improvements on the schedule, will increase output from the mines another 30 per cent by 1952.

More People for Defense

Some 7.2 million additional men and women needed for defense industry and services

LABOR SECRETARY Maurice J. Tobin says the nation will need an additional 7.2 million men and women for the defense industry and the armed forces by the end of 1952.

He says the goal can be met through a normal growth in the labor force of 1.8 million; through an additional defense-stimulated growth of 1.4 million; through a reduction of 600,000 in the number of unemployed; and through a shift of 3.4 million workers from nondefense to defense activities. The shifts "can be attained without controls," says Mr. Tobin.

One in Six — About 12 million people, or more than one out of every six in the American labor force, will be in the armed forces or engaged in work connected with the defense effort by the end of 1952. At that stage, says Mr. Tobin, there will be a total labor force of 68.4 million: 3.5 million in the armed forces; 8.5 million civilians in defense employment; 54.9 million in nondefense employment; and 1.5 million unemployed.

The low unemployment level projected for 1952 represents, for the most part, labor turnover rather than a shortage of jobs. It contrasts with the present figure of 2.1 million and the low point of about 500,000 during the full-mobilization effort near the end of World War II.

Work Stoppages Rise

New work stoppages totaled 350 in March the same as in February but 20 per cent more than a year ago according to preliminary data gathered by the U. S. Labor Department's Bureau of Labor Statistics.

Workers engaged in new stoppages decreased from 220,000 in February to 140,000 in March. The largest March strike involved 11,000 employees of Jones & Laughlin Steel Corp. and a subsidiary railroad at Pittsburgh. Total strikes in effect in March, including those already in progress at the beginning of the month, numbered 550, with an estimated 280,000 participants.

OVERHEAD UNLOADER MOVES ORE
. . . five tons at one scoop

Export License Applications

Third and fourth quarter filing dates for export license applications covering aluminum, copper, iron and steel have been set by Office of International Trade. The new filing timetables are designed to permit advance OIT programming of exports under the Controlled Materials Plan. Exporters must submit all third quarter license applications covering aluminum, copper, iron and steel for export (including all such commodities covered by CMP) between May 7 and May 15.

Fourth quarter applications for these items must be submitted between July 2 and July 16. However, fourth quarter applications covering alloy and stainless steel must be submitted between June 1 and June 15.

Any license applications received after the closing dates will not be processed by OIT, but will be returned to the applicant without action.

Small Shops Play Ace

Production pool in Omaha goes after defense work. Here's what it's doing and how

SMALL BUSINESSES having difficulty getting defense business might find it profitable to do what's being done in Omaha, Nebr.

There a hundred small manufacturing concerns formed a production pool as a means of speeding defense work through prime contracts and subcontracts. Designated as Omaha Industries Inc., the pool is the first of its kind approved by the government in the present defense mobilization effort.

Several hundred pools of this type were formed during World War II, and among those that were successful was one at Omaha.

Pooling Up — While the Omaha area is the first one to form a pool under the current mobilization program it isn't the only one interested in such a project. Ten or 12 other pools are in process of organization in other states, the Defense Production Administration reports.

The pools are to be concerned only with defense work; regular commercial business is excluded.

The Omaha pool, reactivated under the Defense Act of 1950, is incorporated under Nebraska laws. Each participating firm pays a membership fee. Total number of employees involved is 5279, an average of 52.8 employees per affiliate. Membership is open to other manufacturers in the Omaha area. Appropriate information on all new members must be supplied to the DPA.

Willing To Help—Because management of pools requires an unusually high degree of skill the DPA is not recommending that they be formed, but it will lend its encouragement. DPA will give its assistance wherever needed.

World War II experience indicates that success comes most often to pools headed by one individual or one organization capable of obtaining and maintaining the respect of members. This management factor, DPA points out, is important to federal procurement agencies because it enables them to look to one person or organization for responsibility in completion of a prime contract. Experience has shown also that in obtaining subcontracts the pool has more bargaining power with prime contracts than an individual small firm.

What It Takes—For a pool to be successful it needs "staying" qualities to cover the period from organization until the first contract is obtained; this sometimes takes months. Responses to questionnaires received from many production pools in World War II indicate that major reasons for failures included inability to obtain war contracts, poor management, inability to meet competition, scarcity of skilled labor, and refusal of prime contractors to subcontract.

If you'd like to form a production pool, submit a plan of operation to the Pooling Section, Procurement Assistance Division, Office of Small Business, National Production Authority, U. S. Department of Commerce. You'll have to show that the proposed pool is in the public interest as a contributing factor to national defense. For example, it should be shown that: Defense production will be accelerated by the pooled facilities; or more effective distribution of defense contracts among smaller business enterprises and spread of employment will result; or defense production will be further decentralized. Other justifications may be set forth.

Save Men, Money by Mechanization

Modern materials handling could cut $2 billion from industry's costs, release million men for productive work—theme at Chicago show and conference

AMERICAN industry spent more than $9 billion last year, just to move its materials and products from one place to another. If all these moves had been made with modern equipment and methods, at least $2 billion could have been saved. Nearly 1 million workmen could have been released for productive work.

It is toward this end that the 25,000 visitors to the Fourth National Materials Handling Exposition and Conference in Chicago Apr. 30-May 4 are working.

Acres and Dollars—Ten million dollars in new models of trucks, conveyors, hoists, cranes, pallets and tote boxes and other handling equipment were exhibited in eight acres of space at the International Amphitheatre.

Space Saving—More plant capacity through space savings currently is emphasized by materials handling equipment manufacturers. Their story is this: Materials and manpower shortages often make new building impractical at a time when a need exists for expanding production. More efficient materials and product storage—higher stacks, narrower aisles, less free space, etc., made possible by new handling equipment—can make space formerly used for storage available for manufacturing.

New Developments—Watch for trucks using propane-butane fuel. Manufacturers report an insistent demand for mobile equipment using liquefied petroleum gas. Several are engaged in developmental work. Diesel engine lift trucks are available from at least two manufacturers. Two-way radio systems, similar to those used by taxi companies, are on the increase. They combine fast communication with mechanized han-

FOURTH MATERIALS HANDLING SHOW IN CHICAGO
. . . Boost plant capacity by saving storage space

dling to reduce idle equipment time. Time savings up to 25 per cent are reported by large users.

Shorter turning radius, more compact and rugged construction and simplicity of design feature new model trucks and tractors. Pallets take less space. More metal containers are offered.

Diversification—More manufacturers are offering or will offer both gas and electric powered units. Their idea is to fit the unit to the job and the plant situation. From a competitive situation, they believe their sales recommendations will carry more weight if they can offer both.

Equipment manufacturers are engaged in large expansion programs. Hyster Co. is doubling capacity. The Yale & Towne Mfg. Co.'s Philadelphia Division has more than doubled production of trucks and hoists since last June. Many of the other 240 exhibitors report sizable expansion programs.

Demand—Yale & Towne just received an order for 940 gas trucks, largest in the company's history, from the Navy. Thirty-five per cent of company's current production is going to the armed services, 50 per cent to defense-support industries and 15 per cent to other civilian users.

Other manufacturers say comparatively little of their output is going to the military services. But demand from industry is heavy and deliveries often are extended. Emphasis generally is on maximum production of current models and manufacturers are hesitant about making changes that would interrupt output.

Materials—Steel, iron and copper supplies plague practically all equipment manufacturers. At least two manufacturers have substituted concrete for steel for ballast purposes. Another, unable to obtain carbon steel, was forced to use nickel-chrome steel in ballast applications for several rush jobs.

Price Order Issued

Formula for fixing ceiling prices for machinery and related manufactured goods is presented in a 16-page order, CPR 30, just issued by the Office of Price Stabilization. The regulation is a companion measure to CPR 22, the manufacturers general ceiling price regulation. Pricing methods used in CPR 30 are the same as used in CPR 22, with certain exceptions made necessary by the nature of the industries covered.

CPR 30 covers these types of commodities: Prime movers, industrial power apparatus, material working and fabricating machinery, machine tools, farm equipment, automotive equipment and parts (excepting passenger cars), insulated electric wire and cable, construction and mining machinery, electrical equipment, railroad equipment, forgings, auxiliary industrial equipment, stampings, screw machine products, fabricated structural steel, marine equipment, aircraft parts, subassemblies and parts for all the foregoing.

The only substantial difference between the pricing technique of CPR 22 and CPR 30 is in the determination of base period prices. Under CPR 30 the first base period price which is required to be used is the published list price. Delivered prices can be used only if there was no contract price or written offering price available to the manufacturer as a basis for price determination.

To the base price the manufacturer is permitted to add the permitted labor cost and material cost increases as in CPR 22.

STEEL's Weekly Summary of Subcontract Opportunities

SUBCONTRACTS awarded recently by Air Force prime contractors show this industry continues to be one of the best routes for supplier companies to take into the defense program.

Outstanding current example is the multi-million dollar agreement between Curtiss-Wright Corp. and Allis-Chalmers Mfg. Co. for the latter to supply Wright Engine Division the compressors for the J-65 Sapphire jet engine now entering large-scale production at Wright's Woodridge, N. J., plant. Immediate production by Allis-Chalmers will be confined to a pilot production line in Terre Haute, Ind., manned by only 300 employees. The company is building a new $5 million plant on 200 acres of land near that city and parts of the component probably will be sub-subcontractible before this 400,000-square-foot facility is available.

Among West Coast aircraft manufacturers, Ryan Aeronautical Co., San Diego, Calif., has a $29 million backlog that includes experimental production of Ryan XQ-2 jet pilotless target planes and production and assembly of L-17B Ryan Navion liaison craft. Lockheed Aircraft Corp. has new Navy and Air Force orders for its T-33 and TO-2 jet trainers, increasing the company's military commitments to a new peak.

A contract to make Navy fire control equipment was received by Daystrom Inc., Elizabeth, N. J., and will be turned out by the firm's new Instrument Division, established to handle defense work.

Other awards, of interest to metalworking companies are:

Product	Contractor
Feed Heaters	Landers, Fary & Clark, New Britain, Conn.
Adapters (cylindrical)	Livingston Machine & Tool Co., Frostburg, Md.
Temperature Regulators	Robertshaw—Fulton Controls Co., Knoxville, Tenn.
Truck-Mounted Portable Ramps	Douglas Aircraft Co. Inc., Santa Monica, Calif.
Trailers (capacity 10 tons)	Mercer Engineering Works Inc., New York
Trucks (pallet, 6000 lb. capacity)	Service Caster & Truck Co., Albion, Mich.
Road Graders	J. D. Adams Mfg. Co., Indianapolis Galion Iron Works & Mfg. Co., Galion, O. W. A. Riddel Corp., Bucyrus, O.
Cranes (floor type)	Manley Mfg. Div., American Chain & Cable Corp., York, Pa.
Semitrailers (12-tons, cargo)	Fruehauf Trailer Co., Detroit
Semitrailers (30 tons, platform)	Eidal Mfg. Co., Albuquerque, N. Mex.
Water Pumps	Marathon Foundry & Machine Co., Wausau, Wis.
Oil Fired Heaters	National Heater Co., St. Paul
Hydraulic Presses	Studebaker Machine Co., Maywood, Ill.
Surface Grinders	Mattison Machine Work, Chicago
Double Crank Presses	Minster Machine Co., Minster, O.
Automatic Chucking Machines	Potter & Johnson Machine Co., Pawtucket, R. I.
Cabinet Turret Lathes	Rivett Lathe & Grinders Inc., Boston
Grinders	Norton Co., Worcester, Mass.
Drilling Machines	Baush Machine Tools Co., Springfield, Mass. Cincinnati Bickford Tool Co., Cincinnati Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
Broaching Machines	La Pointe Machine Tool Co., Hudson, Mass.
Cut-off Machines (universal & abrasive)	Tabor Mfg. Co., Philadelphia
Metal Shapers	Delta Div., Rockwell Mfg. Co., Milwaukee
Milling Machines	Charles A. Strelinger Co., Detroit
Motors	Diehl Mfg. Co., Somerville, N. J. Servo-Tek Products Co. Inc., Paterson, N. J.
Refrigerators (shipboard type)	F. W. Lang Co., Philadelphia Traulsen & Co. Inc., Long Island City, N. Y. Jordan Refrigerator Co. Inc., Philadelphia
Diesel Engines	General Motors Corp., Detroit
Diesel Generator Sets	United States Motors Corp., Oshkosh, Wis.
Barges	Portland Tug & Barge Co., Portland, Oreg. Tampa Ship Repair & Dry Dock Co., Tampa, Fla.
Radio Beacon Communications Sets	Wiley Mfg. Co., Port Deposit, Md. Gates Radio Co., Quincy, Ill.
Current Meters & Transmitters	Surveyor Service Co. Inc., Silver Spring, Md.
Calculating Machines	Remington Rand Inc., Bridgeport, Conn.
Radio Compass Components (aircraft)	North American Philips Co., Mt. Vernon, N. Y. Lowrey Organ Div., Central Commercial Industries Inc., Chicago Technicraft Corp., Kansas City, Mo.
Radio Receivers	Hammerlund Mfg. Co., New York
Converters	Electronic Measurement Co., Eaton, N. J.
Alternators	Eicor Inc., Chicago
Indicators	Kollsman Instrument Corp., Elmhurst, N. J.
Pressure Transmitters	Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N.J.
Aluminum Drop Tanks	American Stove Co., St. Louis Bowser Inc., Ft. Wayne, Ind.
Bomb Tails	Union Switch & Signal Co., Swissvale, Pa.
Signal Generators	Harvey Wells Electronics Inc., Southbridge, Mass.
Wheel Assemblies	B. F. Goodrich Co., Akron

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Materials Orders

RUBBER—Amendment of May 1, 1951, of NPA Order M-2 permits an increase in May in production of many rubber products for civilian use, including important industrial, commercial and medical items.

ALUMINUM—Amendment of May 1, 1951, of NPA Order M-7 permits manufacturers of certain types of prime aluminum windows and frames to use during May and June 65 per cent of their monthly average consumption of aluminum during the first half of 1950. This relaxes certain previous restrictions. The 65 per cent permissible use of aluminum under the May 1 amendment applies to window screen frames (including top and bottom bars for tension screens); ledger openers; residential type windows; and nonresidential type windows (except curved head architectural types).

CADMIUM—Amendment of Apr. 26, 1951, of NPA Order M-19 relaxes limitations on the use of cadmium to permit it to be used in three additional classifications: (1) Ferrous nuts, bolts, screws and other threaded parts, washers, hi-shear rivets, lock bolts and cotter pins for use in aircraft; (2) parts of automotive and aircraft fuel pumps which come into contact with fuel; and (3) aircraft battery hold-down bars. The amendment, which is effective Apr. 26, 1951, also relieves manufacturers from necessity of issuing certification as to end-uses of finished sub-assemblies ready for assembly by the purchaser into final end-products.

CANS—Direction 1 to NPA Order M-25 tightens provisions of the order to prevent any packer's consumption of cans made of tin plate or terne plate from exceeding that of the base period rate provided for by the order. Direction 1 is effective May 1, 1951.

CHEMICALS—Amendment of May 1, 1951, of NPA Order M-32 adds several chemicals to NPA's basic order which provides a system of equitable distribution of defense-rated orders among producers to prevent order pile-ups. Amendment is effective May 1, 1951.

MOLYBDENUM—Amendment of May 1, 1951, of NPA Order M-33 reduces from 45 days to approximately three weeks the lead time on applications for allocation of all forms of molybdenum except metal powder, wire, rod and sheet. On these the lead time remains at 45 days. On products on which the lead time is reduced the applications for allocations must be filed no later than the seventh day of the month preceding the month in which delivery is requested. The amendment also stipulates that molybdenum must not be used where substitution is practicable, and that no person shall dispose of any scrap, waste material, or residue (other than scrap molybdenum metal) containing commercially recoverable molybdenum fit for remelting, except for use in manufacture of products in which molybdenum is an essential component. Amendment is effective May 1, 1951.

COLUMBIUM & TANTALUM — Amendment of Apr. 26, 1951, of NPA Order M-49 requires every person who consumed or had in his possession or control more than 10 pounds of contained columbium and tantalum during any calendar month to file a report of his inventory and consumption by the seventh day of the following month. Prior to this amendment the report was required to be filed not later than the 15th of the month. Permissible working inventories of columbium and tantalum were increased from a 30-day to a 45-day supply. Amendment effective Apr. 26, 1951.

ELECTRIC UTILITIES—Amendment of May 1, 1951, of NPA Order M-50 extends from May 1 to June 1 the right of electric utility companies to use materials now on hand in making major plant additions without specific approval of the Defense Electric Power Administration.

GLASS CONTAINERS—Schedule 1 to NPA Order M-51 establishes simplified designs for 42 basic glass containers. The designs are illustrated in the schedule. Effective date of the schedule was Apr. 27, 1951.

STRAPPING—M-58, effective May 1, 1951, places restrictions upon the use of metal strapping on light packages shipped short distances, and limits inventories of strapping to 45 days' supply but permits any user to have at least 1000 pounds. The order does not apply to defense-rated orders, except those on DO-97s.

SOLID FUELS—Solid Fuels Order 2 issued Apr. 30, 1951, by Defense Solid Fuels Administration establishes procedures for issuance of DSFA directives requiring or forbidding specific deliveries or shipments of any forms of anthracite, bituminous, sub-bituminous and lignitic coals, and coke. SFO-2 was effective Apr. 30, 1951.

SERIALIZATION—MO-7 issued Apr. 17 by Defense Minerals Administration provides for establishment of identification or serial numbers for mines, smelters and mineral processing plants to be used in obtaining priorities and allocations of scarce materials. Only those producers who have been granted serial numbers will be eligible for such DMA assistance. In a similar order, SFO-1, the Defense Solid Fuels Administration provided for serialization of coal mines, coke plants and coal and coke preparation and processing plants. SFO-1 was effective Apr. 20, 1951.

NPA Regulation

MRO—Direction 2 to NPA Regulation 4 permits exporters to use DO-97 priority ratings to get replacement parts and accessories for machinery and equipment for shipment to foreign countries during May and June. Canada is not included in Direction 2, inasmuch as it already had been given the rating privilege. Direction 2 is effective May 1, 1951.

NPA Delegation

In Delegation 10 the National Production Authority delegates to the U. S. Department of Agriculture authority to exercise certain allocation and priority functions over foods which have industrial uses. Delegation is effective Apr. 26, 1951.

Price Regulations

PASSENGER AUTOS—Amendment 2 issued May 1, 1951, by Office of Price Stabilization to Ceiling Price Regulation 1 continues indefinitely the present price ceilings on passenger automobiles.

COAL PRICES—Amendment 1 of Ceiling Price Regulation 3 issued by the Office of Price Stabilization approves continuation of premium and penalty contracts for coal, other than Pennsylvania anthracite, delivered from mine or preparation plant. Amendment 1 was issued Apr. 30, 1951.

MANUFACTURED GOODS — Ceiling Price Regulation 22 issued Apr. 25, 1951, and effective May 28, 1951, sets ceiling prices for many manufactured products at a pre-Korean base plus actual increases in materials costs through 1950 (later for some goods) and increases in factory payroll costs through Mar. 15, 1951.

MANUFACTURERS' PRICES—Interpretation 1 of Ceiling Price Regulation 22 issued by the Office of Price Stabilization stipulates that freight increases authorized by the Interstate Commerce Commission Mar. 12 cannot be used by manufacturers in figuring adjustments in delivered prices they quote. Those freight rate increases became effective after Mar. 15, too late to be used in calculating adjustments. Interpretation 1 was issued May 1, 1951.

MANUFACTURERS' PRICES—Supplementary Regulation 2 issued May 1, 1951, by Office of Price Stabilization to Ceiling Price Regulation 22 allows an alternative method of establishing new ceiling prices by manufacturers. This alternative method permits a manufacturer to determine his ceiling prices by adjusting ceiling prices established by the General Ceiling Price Regulation rather than using base period prices under CPR 22.

MACHINERY—Ceiling Price Regulation 30 issued May 4, 1951, by Office of Price Stabilization is a companion measure to Ceiling Price Regulation 22, the Manufacturers General Ceiling Price Regulation, and sets up methods of pricing machinery and related manufactured goods. Pricing methods used in CPR 30 are substantially the same as those in CPR 22 with certain exceptions which are made necessary by the nature of the industries covered in CPR 30. Both CPR 22 and CPR 30 become effective May 28, 1951.

MICA, TUNGSTEN—General Overriding Regulation 9 put into effect May 1, 1951, by Office of Price Stabilization exempts from price control the sales of raw mica, mica parts and tungsten ores, and sales to federal agencies of tungsten concentrates produced from foreign ore.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

RADIO INTERFERENCE
. . . from jerry-built devices

AEROMAGNETIC MAPS
. . . 35 cents apiece

HOMEBUILDING MATERIALS
. . . scarcer and scarcer

GE PATENTS AVAILABLE
. . . 198 electrical ones

PLANT MANAGERS should take a good look at all electronics equipment in their charge to avoid possible trouble with the Federal Communications Commission. An amendment of the Communications Act of 1934 would empower the government to place a ceiling on the amount of electromagnetic radiation that may be emitted from such apparatus. The bill now is being worked on by the Senate Committee on Interstate & Foreign Commerce.

Its real purpose is to eliminate interference of the kind that plays hob with radio reception. In an all-out war emergency such interference could cause great confusion because the overwhelming proportion of all mobile transportation—on land, in the air and on the sea—today is directed by radio. Great Lakes ore carriers, for example, get their navigation and harbor instructions by air.

"Electronic devices," a government spokesmen told STEEL, "can be built to emit no radiation at all and they can be built economically so as to generate no excess radiation. Most of the equipment now in use is satisfactory. The trouble comes from a lot of jerry-built devices made for sale at bargain prices.

"Plant managers will do well to call in representatives of the manufacturers whose electronic equipment they use, and obtain from them an assurance that they are within reasonable radiation tolerances . . . If industry fails to recognize and discharge its responsibility in this field, the government will be forced to step in."

Maps—Right off the Press . . .

Favorable exploration areas for new iron ore deposits in a 5500-square mile area in western Minnesota are shown in six aeromagnetic maps just completed by the federal government in cooperation with the Minnesota Geological Survey. Copies of the maps, identified as GP46 through GP51, may be obtained at 35 cents each from the Director, Geological Survey, Washington 25.

Less Home Material . . .

First move by Howard Coonley, coordinator of conservation, Defense Production Administration, is to reduce the amount of materials and labor needed in home building. Recent estimates are that through improvement in designs, materials and labor, requirements for new homes can be reduced by anywhere from 15 to 25 per cent. Mr. Coonley asked the committee comprising these men to look into the matter: Leonard G. Haeger, National Association of Home Builders, Washington; Joseph H. Orendorff, Housing & Home Finance Agency, Washington; and A. J. Bulger, Facilities & Construction Bureau, National Production Authority, Washington.

Patents on Reasonable Terms . . .

General Electric Co., Schenectady, N. Y., made available for non-exclusive licensing on reasonable terms 198 patents relating to electrical apparatus and circuit arrangements for the utilization and control of electrical energy. A list of them, by numbers, appeared in the Patent Office's Official Gazette of April 12.

Freight Absorption Bill . . .

The new freight absorption bill, S. 719, was reported by the Senate Judiciary Committee without amendment. Next on the schedule is Senate debate and a vote on the measure. It would make good faith a complete defense in cases of freight absorption.

Pending a Successor . . .

Pending appointment of a permanent successor to General William H. Harrison as defense production administrator, Edwin T. Gibson will serve as acting administrator. Mr. Gibson, on leave from the General Foods Corp. (he's the executive vice president) has been occupying the post of deputy administrator, for staff services, of the Defense Production Administration.

Administrator, RFC . . .

New government title for W. Stuart Symington, St. Louis manufacturer who has filled numerous posts in the Roosevelt and Truman administrations, is administrator, Reconstruction Finance Corp. For the first time this agency, the demise of which is called for by a powerful congressional delegation headed by Senator Byrd, is to be directed by a single individual.

On Building Research . . .

Manufacturers, contractors, associations and interested groups generally are eligible to membership in a newly created Building Research Institute, set up by the Building Research Advisory Board. Its purposes are twofold: To enable industry generally to cooperate in the building research programs of BRAB and to suggest research work in neglected sectors of the field. The Building Research Advisory Board, 2101 Constitution Ave., Washington, is a quasi-government body within the framework of the National Research Council.

Price Stabilization Appointees...

H. H. Needham, A. O. Smith Corp., Milwaukee, joined the Metals Branch, Office of Price Stabilization. He is serving under Walter H. Dupka, chief of the Iron & Steel Section, and was assigned to fabricated steel products.

Karl P. Fuhrmann, Barrel & Range Boiler Division, Wheeling Steel Corp., Wheeling, W. Va., also is serving under Mr. Dupka in connection with steel containers.

Both Mr. Needham and Mr. Fuhrmann can be reached on STerling 4200, Ext. 4610.

U. S. Exports to West Europe Change

We're shipping fewer metalworking products under ECA, but U. S. guarantees of foreign investments and royalty payments are spurring the export of capital, know-how

EXPORTS of American money, patents, processes and know-how have already partly supplanted and eventually will replace America's ECA shipments of metalworking products to Marshall Plan countries.

Currently, only about 3 per cent of Marshall Plan purchase approvals is going for machinery and vehicles, compared with about 20 per cent a year ago. That 3 per cent figure may drop still lower if a unique investment insurance plan is widely used.

Milestone—For the first time in the history of any country, the U. S. will insure businessmen's foreign investments against loss from expropriation or confiscation. Although the guaranty is broad enough to cover losses resulting from a taking of property by totalitarian governments which may come to power in any Marshall Plan country by revolution or military conquest, it does not cover war damage or business risks.

In order to provide practical assistance in the development of policies for the new type of guaranty, ECA has been working on a pilot case which will be announced soon. ECA is now inviting applications for the new guaranty. A detailed statement of policies and procedures is being prepared and will be sent to applicants on request as soon as available.

Shift—In another move which may shift American exports from machinery to money, patents and know-how the U. S. government is guaranteeing royalties when a company in this country licenses a company in West Europe to use its patents and processes. Gardner-Denver Co., Quincy, Ill., maker of oil field and mining equipment, signed the first such Marshall Plan guaranty contract. The European firm involved is Maschinen Fabrik A. Beien, a coal mining equipment producer in Herne, West Germany. The guaranty insures convertibility into dollars of up to $140,000 worth of deutsche marks, the royalties figure in a licensing arrangement applying to mine car loaders. Beien is granted rights to manufacture and sell mine car loaders using Gardner-Denver processes. In addition, Beien can use Gardner-Denver technical assistance and is also acquiring manufacturing rights under German patents that Gardner-Denver may obtain later. Beien pays royalties based on net receipts for sales. They are expected to start at $5000 for the first contract year. Gardner-Denver estimates that sales of the Beien-manufactured equipment will reach the equivalent of about $1,250,000 during the first five years of the licensing contract.

Marshall Plan guarantees on industrial investments of cash and physical assets were provided for in the original ECA Act, approved in April, 1948. Amendments to the act in 1950 extended the guaranty provisions to include royalties covering licensing of patents, processes and techniques even though intangible items are contributed without an accompanying investment of cash or physical assets.

Exported Know-How — American know-how, exported in the form of information given European productivity teams visiting this country, is beginning to boost Europe's production, says ECA. So beneficial has been the visiting-team technique that it is being used in intra-European efforts to boost output.

The Organization for European Economic Cooperation (OEEC) proposed four such teams involving 80 participants from 10 countries; 450 French manufacturers have consented to receive OEEC teams, giving them an opportunity to analyze French production techniques. One intra-European project has already been completed, a study of industrial censuses.

Ruhr Needs More Coal

The Gardner-Denver deal with Beien in West Germany was made because of the coal shortage in the Ruhr. The German Coal Board estimates that domestic mines need about 500 mine car loaders.

Coal and iron ore shortages are playing havoc with steel production. For the want of steel, German auto companies are forced to slacken operations. Even the machinery makers have had to slow down, although not as much as autobuilders.

The first continuous steel plate mill built since the war will go up near Dortmund and will have an annual capacity of 300,000 tons. It's scheduled to start production within 15 months and is financed by ERP funds. The unit will supply plates for shipbuilding, on which Allied production curbs have been lifted. The removal of curbs has thus far been a token gesture only, because of the plate shortage.

German rolling mills in general are rather antiquated, most of them dating back to World War I. At least 66 per cent of all German mills are outdated and unprofitable. The most modern of the nation's equipment was dismantled. Half its sheet and strip capacity was taken out. It had

NEA photo

REINLISTED: Rescued from an Army vehicle dump, this armored car undergoes a complete rebuilding job at the Royal Ordnance Factory in Cardiff, Wales. It's one of thousands of British Army rolling stock dumped at the end of World War II and now recalled for a part in Britain's peacetime rearmanent program

to import 209,000 tons of rolled steel products in 1950, mainly from the Saar and Belgium, as a result of the dismantlings.

U.K. Sees Slight Output Gain

The British expect a 4 per cent increase in industrial production in 1951 over 1950, but rising prices of imports will make it touch and go as to whether the nation will balance exports and imports in 1951, as it did in 1950.

The cost of imports will be up by about $2380 million in 1951, bringing the total bill for imports to about $8960 million. An increase of $140 million in the net value of earnings from shipping, interest, profits and dividends, foreign tourists' expenditures in the U. K. and other sources will bring $1260 million, so the value of manufactures and raw materials exported or re-exported will have to rise from about $6160 million in 1950 to about $7700 million in 1951.

The U. K.'s metal consuming industries produced $6720 million worth of goods in 1950, providing about 40 per cent of all British exports.

M. I. T. Plans Industry Courses

Plans for special summer courses to benefit engineers in industry have been completed and dates announced by Massachusetts Institute of Technology. Directors for each of the periods will be M. I. T. faculty members, says Prof. Walter H. Gale, director of summer sessions.

First of the courses will be a study of lubrication engineering, under direction of Dr. John T. Burwell, June 11-22; next period will consider metal cutting, June 25-July 6, and will be directed by Professors Milton C. Shaw and P. A. Smith; the third session will study hydraulic power control, July 9-20, directed by Prof. John A. Hrones.

June 19-July 23 are the dates set for a one-week intensive course in corrosion, under direction of Prof. H. H. Uhlig, who is in charge of the M. I. T. corrosion laboratory. On the schedule are discussions on equipment, chemical treatment of the environment, cathodic protection and selection of coatings and alloys.

Taylor Instrument Expands

Taylor Instrument Cos., Rochester, N. Y., will begin a $700,000 construction program to assure efficient flow of materials through their plant. Lewis G. Swift, president, announced the program would handle expanding business. A single-story building with 44,616 square feet of floor space will be erected.

Tool Switch Aids Early Tank Debut

Cadillac ingenuity keeps production ahead of schedule by rush job on boring mill. The tool needed would take a year to build, so they dreamed up a substitute

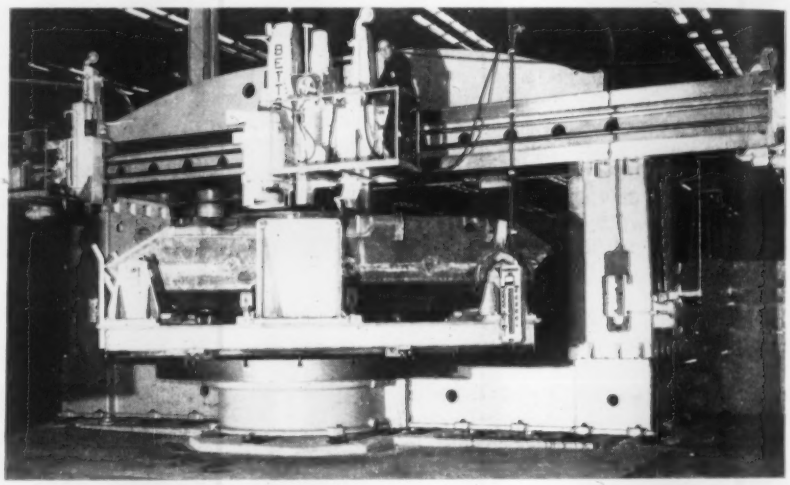
FINISH-machining the 84-inch diameter turret opening in the cast armor steel top of the new T-41E1 light tank being built for Ordnance by Cadillac at its Cleveland arsenal taxed the ingenuity of equipment planners. Among other things, they were up against a seven-month time schedule to make the production target date. The circular turret opening has to be held to an accuracy of 0.003-inch on the diameter and must be finished after the basic hull structure, over 20 feet in length, has been assembled and welded.

The first and most obvious answer was to install a standard 28 or 30-foot vertical boring mill, such as is used at the Detroit Arsenal of the Ordnance Tank-Automotive Center. A machine like this would have cost in the neighborhood of $300,000 and would have taken a minimum of 12 months to build, to say nothing of installation and tryout. There are perhaps only a dozen pieces of equipment like it in the country.

Brainwork—Always alert to possible modifications in methods and equipment, particularly where time is short, Cadillac's process engineers, who are thoroughly schooled in automotive techniques, came up with the idea of fitting out a boring mill having a standard 12-foot diameter table and bed with special end columns and cross rail, providing a 24-foot opening inside the columns. The rail is mounted in a fixed position, instead of being adjustable, and is fitted with two standard vertical tool slides. It extends well beyond the supporting columns at either end.

A standard 12-foot Betts mill was ordered and the rebuilding undertaken by Consolidated Machine Tool Corp. The equipment was completed and delivered in 5½ months, at a cost saving (to the taxpayer) of 50 per cent over what a larger mill would have run.

Rigid Mounting—For boring and facing the hull top, the entire hull is mounted rigidly in a special fixture which locates through final drive openings and front sprocket openings by means of stub arbors bolted in place. To speed the operation, duplicate fixtures are available, so that as one is mounted on the boring mill table, another is being loaded and locked up so that it can be swung into place quickly by crane as soon as the preceding hull is finished.



BETTS BORING MILL REBUILT TO FINISH-MACHINE TANK TURRETS
. . . Cadillac alertness saves time and money

Mindful of the possibility of design changes in the hull, equipment planners had to recognize the need for a certain flexibility in operation of the boring mill. It the first place, there will be other combat vehicles in the light tank family which Cadillac will undertake to build. They will have identical basic hull dimensions with the T-41 but modifications of the superstructure. In the second place, difficulty has been experienced in the supply of cast hull top sections because of foundry problems.

Forged Top—It appears certain a change is in store to a composite forged armor plate top, with components welded together. This would

IN A NUTSHELL: Power packed are these replacement jet engines for Air Force fighters, canned in large steel containers built by Rheem Mfg. Co., at Sparrows Point, Md. Shock-mounted and sealed against humidity, the engine can be stored indefinitely without service, and floated ashore during amphibious operations. The cylindrical container opens along a longitudinal seam into two equal parts. They will undoubtedly wind up as bathtubs for enterprising GI's

raise the danger of breaking the carbide tools in trying to machine through the thin welds. The alternative, of course, is to grind the opening, so it was decided to equip the cross rail of the boring mill with a special grinder head mounted on a slide, and driven by a 25-horsepower motor. It may be noted in the photograph, between the two tool slides.

Table drive is through a 75-horsepower motor, providing speeds in the range of 2 to 12 revolutions per minute, giving the equivalent of 44 to 264 feet per minute travel of work at the tool plant.

Foxboro Adds Assembly Building

The Foxboro Co., Foxboro, Mass., will construct a 50,000-square-foot single-story building to be used for the final assembling and testing of recorders and controllers. Transfer of these operations from the older buildings to the new structure will permit expansion of departments that produce electronic and electric instruments and control equipment. Centralized stock department in the new building will supply the various assembling departments. Finished instruments will then move directly to the packing and shipping rooms. Construction will provide an increase of nearly 25 per cent over existing facilities.

Ford Studies New Jeep

A developmental contract with the Ordnance Dept. has put Ford Motor Co. back to work studying the possibilities of producing a lighter and cheaper jeep-type vehicle. Ordnance wants a simplified version with the same performance. Another Ford assignment is development of a special small caliber gun for the Army.

Aircraft fuel injection systems for Wright R-3350-57 engines will be built by Ford's Parts & Equipment Mfg. Division in a new plant, location of which has not been determined. About 3000 employees will be used on this assignment.

'Convertiplane' Designs Picked

Competition sponsored by the Air Force among leading aircraft manufacturers to produce a workable "convertiplane" found three companies with models selected for further development.

The "convertiplane" will combine take-off and landing characteristics of the helicopter with speed and range performance of fixed-wing aircraft. Initial developments are intended to provide a liaison-type for use by Army ground forces and to furnish data for larger designs.

The project attracted 17 companies and a total of 19 designs. Picked as best of the lot were those submitted by McDonnell Aircraft Corp., St. Louis; Bell Aircraft Corp., Buffalo; and Sikorsky Division of United Aircraft Corp., Bridgeport, Conn.

GE Reports on Jet Bomber Tests

"Only relatively minor maintenance to date" is the operations report made public by General Electric Co. on its special jet engine test program being conducted for the Air Force at altitudes of seven miles or more.

For the test, GE is using a four-jet North American B-45 bomber, assigned ten months ago to the company's Aircraft Gas Turbine Division. The J-47 powerplants are being tested under closely controlled conditions impossible in normal military operations.

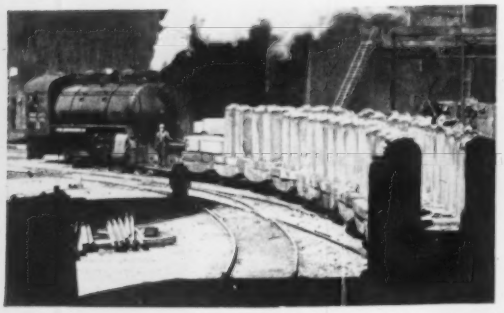
Engine inspection and maintenance time is less than half that needed for piston engines under similar conditions but the absence of reverse thrust makes jet landings hazardous on slippery runways because of the need for initial braking power, reports the bomber's American Airlines crew.

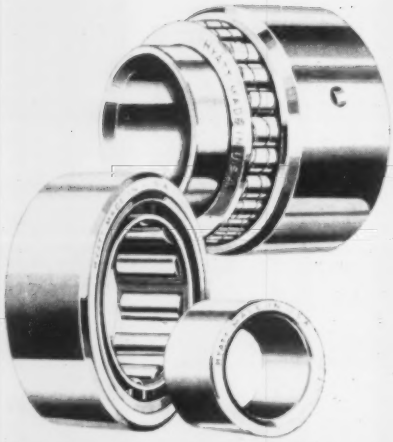
Summarizing more than 70 test flights for the National Aeronautic meeting of the Society of Automotive Engineers, the crew members also reported: The entire icing problem is greatly alleviated with the jet plane; jet transports could operate safely from most of the nation's airports when free from ice and snow; acceptable descent and approach procedures under instrument conditions are lacking for jets.

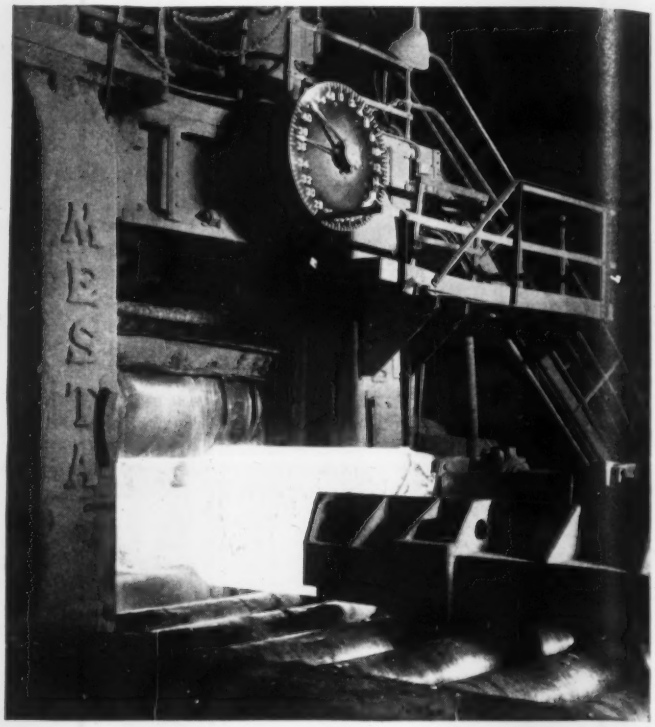
Small Business' Share in Southern California's Aircraft Industry

Company	Current Backlog (Millions)	% of Sales $ Subcontracted	% of Subcontract $ going to "Small Business"	Total Number of Sub-contractors	% of Sub-contractors that are "Small Business"
Consolidated Vultee Aircraft Corp.	$900	43.2	22.0	2810	77.2
Douglas Aircraft Co. Inc.	$788.5	(34.7)	35.0	3000	90
		(46.5)	(40.0)	(4000)	(91.2)
Lockheed Aircraft Corp.	$636	47.0	30.0	2360	71
		(51.0)	(28.0)	(4000)	(71)
North American Aviation Inc.	$466.6	36.0	35.0	4600	80
Rohr Aircraft Corp.	N.A.*	52.2	25.0	1211	78
Ryan Aeronautical Co.	$25	41.9	50	1367	91
		(43.8)	(50)	(1500)	(91)
Aerojet Engineering Corp.	N.A.*	N.A.*	95.0	N.A.*	N.A.*
Bendix Pacific Division	N.A.*	N.A.*	50.0	N.A.*	N.A.*
Northrop Aircraft Inc.	$300	N.A.*	87.0	N.A.*	N.A.*
Hughes Aircraft Co.	N.A.*	N.A.*	75.0	N.A.*	N.A.*

Source: Aircraft Industries Association. * Not available. Figures in parentheses are estimates for 1951







Taking Shock Loads and High Temperatures in Stride

Sudden shock loads and abnormal temperatures are the steady diet for bearings in steel mill equipment.

In National Steel Corporation's plant at Ecorse, Michigan, The Great Lakes Steel Corporation, Hyatt Bearings are installed in the table rollers, feed rollers, screw down and manipulators on the Blooming Mill and on the tables, guides, strippers and rotary flying shears of the Hot Strip Mill. On ingot cars, too, the same day in and day out dependable performance of Hyatts justifies their selection.

For new equipment or change-overs always specify Hyatts, the preferred bearings for steel mill applications. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

By H. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

By yearend there will be a definite swing toward automobiles with high compression engines—7 to 1 or higher. GM's 19XX (12 to 1 compression) engine is one to be watched

DETROIT

A LITTLE-NOTICED milestone in automotive engine development has been reached. High compression engines, as they are now defined, are powering almost half the cars now being produced, even though the two largest selling automobiles are not in the high compression category. By yearend—if nothing drastic happens—the production balance will swing toward cars powered by engines of 7 to 1 or higher compression ratios.

High Time—Thus a new reference point for defining *high compression* will be adopted. Perhaps 7.5 to 1 will be the line of demarcation, though that would include a great many present engines. Anyway, it is high time to take a look at what it all means in terms of the economic advantages of the higher compression engines.

Allegations have been made that the industry's eagerness to develop more powerful engines leads it away from consideration of economical performance. Disproving the fallacy is as much a surprise to automotive and petroleum engineers as it is to those outside the industry. Last week in Tulsa, Okla., Charles L. McCuen, head of General Motors Research Laboratories, admitted he sometimes thought industrial achievements are not told clearly or widely enough for all. It's not a question of hiding a light under a bushel as much as it is recognizing that technological improvements come slowly and in small increments. "It is only when data over a period of years are analyzed that the magnitude of the work becomes evident," he explains.

The Route—The concept of improved efficiency via the high compression route is not new. It was fundamental even before the auto industry was conceived. Chrysler said he had the first high compression automobile back in 1924. But the spurt in developing high compression has been noticeable only in the last four years. It got a good part of its impetus from Charles F. Kettering. "Boss Ket," then occupying the position now held by Mr. McCuen, made automotive history when he announced the results of tests with an experimental six-cylinder overhead valve engine with a compression ratio of 12.5 to 1. He dropped his bombshell at the Society of Automotive Engineers meeting in a paper titled "More Efficient Utilization of Fuels." With an equally innocuous title, Mr. McCuen repeated the performance last week.

High-powered General Motors research men looking over the high compression engine are: Charles L. McCuen, vice president and general manager of the Research Laboratories Division; C. F. Arnold, Cadillac chief engineer; M. J. Muzzy, director of GM Phoenix Laboratory; John M. Campbell, head of organic chemistry; Ralph A. Richardson, head of technical data; Darl F. Caris, head of advanced engine development; and J. P. Brannan, of road testing and carburetion

Addressing the midyear meeting of the Division of Refining of the American Petroleum Institute, and speaking on the "Economic Relationship of Engine-Fuel Research," he made public an experimental V-8 engine with 12 to 1 compression ratio that eclipses the fuel economy of the Kettering design.

Analytical Approach—Mr. McCuen disclosed GM proving ground test results on 29 models of 15 makes of cars over the 1930-1950 period. From that cross-section of the industry come these significant trends: **1.** Average curb weight increased 250 pounds from 3500 to 3750. **2.** Rated horsepower of the average went from less than 75 to almost 120, the spread remaining great and in 1950 ranging from 85 to 160. **3.** Average compression ratio increased two points, from 5.0 to 7.0, most new engines having a 7.5 to 1 ratio and the lowest being 6.5 to 1. **4.** Maximum auto speed (not an aim of the industry, he explains, but a value that came from increased performance) went from 66 miles per hour in 1930 to almost 90. **5.** Average miles per gallon increased more than 30 per cent (at 40 miles per hour), going from 15 miles per

QUARTET OF CADILLACS
. . . 12 to 1 engine under the hood of the 19xx

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gallon to almost 20.6. Ton-miles per gallon gained 46 per cent, from 29 to 42.5.

Quartet—With a dramatic flair, characteristic of the industry and with the painstaking analytical approach, likewise typical, GM used another method of demonstrating "where we came from, where we are and the state of our knowledge of what we can do in the future." In February and March a quartet of Cadillacs underwent tests at GM's Phoenix, Ariz., lab. The caravan comprised a 1915 model (the first American V-8 engine was introduced in it), a 1935 job, a 1951 design and an auto that Mr. McCuen calls the 19XX (it sports the appearance of a new Cadillac but has a 12 to 1 compression ratio engine and a new Hydra-Matic transmission).

What made the tests of signal importance, aside from the data derived from the experimental engine, was that they marked what is believed to be the first time modern instrumentation was used to measure performance in directly comparative figures.

Power a la Carte—Displacement of the 12 to 1 engine was selected to

CADILLAC TEST CAR DATA

	1915	1925	1951	19XX
Displacement	314	353	331	287
Compression Ratio	4.25	6.25	7.50	12
Maximum BHP	77 at 2600	108 at 3000	133 at 3600	148 at 4000
Wheelbase	122	128	126	126
Curb Weight	4140	5050	4440	4440
Axle Ratio	5.07	4.6	3.36	2.75
MPG at 40 MPH	9.5	13	19.8	27.6
Octane Rating	60	67	90	103

give the 19XX about the same horsepower characteristics and road performance as in the 1951 Cadillac. GM considers those adequate under present-day traffic problems and road conditions.

Greatly increased horsepower could be obtained by elevating displacement to the 1951's level and "any power demand by the customer" can be provided, Mr. McCuen confides.

Performance-wise the '51 Cadillac was used as a base. Going from a standing start, the '15 lagged 1000 feet behind the '51 after 28 seconds, the '35 was about 400 feet behind the '51. The '51 and the 19XX stayed about even, but the 19XX ran in front by a few feet at the end of 35 seconds.

Maximum speeds of the four, chronologically, were: 55, 85.1, 98.5 and 102.25 miles per hour. The 19XX job's higher speed was the automatic result of matching the two for acceleration at lower speeds. It was not deliberately sought.

Says Mr. McCuen: "Large gains in

ASSEMBLING THE 12 TO 1
. . . higher speed an automatic result

economy were confirmed by further tests on the '51 and the 19XX cars made under city traffic and open highway driving conditions. From all our experience, it would be conservative to say that a saving of 30 per cent over present fuel consumption is possible with a combination of 12 to 1 engines and new types of automatic transmissions."

Between 1915 and 1951, ton-miles per gallon at 40 miles per hour improved 125 per cent, increasing from 22.5 to 50.5. Comparing the 19XX and the 1915 cars, the increase is well over 200 per cent, from 22.5 to 69.5 ton-miles per gallon.

Petroleum's Part—Improvements in engine performance over the years are not solely the doing of automotive men. Mr. McCuen is quick to acknowledge the petroleum industry's better product. Improvements in antiknock quality began about 1920 when thermal cracking reached large scale commercialization. Introduction of tetraethyl lead in commercial premium gas in 1923 gave the octane number trend line a big boost. In the late '30s significant advances came with catalytic cracking, thermal reforming and hydroforming. Catalytic reforming, arriving on the scene in 1949, promises still higher octane ratings.

The 12 to 1 engine needs special fuel, estimated at the equivalent of 103 octane number. It uses 100 octane fuel to which is added 0.4 milliliters of tetraethyl lead. That's a big leap for the petroleum industry to take. Mr. McCuen admits that. He says Oldsmobile had an 8 to 1 engine ready for its 1951 models but felt compelled to hold off because of the emergency situation existing in high octane gasolines.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	658,918	505,593
March	802,737	610,680
April	681,300*	585,705
May		732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622

Weekly Estimates

Week Ended	1951	1950
Apr. 7	158,076	133,172
Apr. 14	162,839	147,240
Apr. 21	166,502	151,613
Apr. 28	163,883	148,274
May 5	164,000*	146,337

Estimates by Ward's Automotive Reports

* Preliminary estimates by STEEL.

Auto Output Higher than Sales

Indications that new car sales are sagging tend at first glance to be refuted by new registration figures, as compiled by R. L. Polk & Co. March sales, when completely tallied, are expected to set a new record for the month: A whopping 515,000 passenger cars.

That would compare with 495,885 in March, 1950. For first quarter, Polk estimates, registration of passenger cars will approximate 1.4 million. In first quarter last year 1,286,437 new cars were licensed. March truck registrations are expected to reach 89,000, compared with 96,266 in March, 1950. First quarter truck sales will be about 259,000, more than 20,000 higher than in first quarter 1950, when all the figures are compiled.

However, U. S. production of cars and trucks in first quarter ran about 340,000 units higher than last year so the gap between factory output and sales has widened by approximately 200,000 units. That increase is sufficient to have many dealers genuinely alarmed. National Automobile Dealers Association is advising all dealers to report inventory and sales conditions to their federal reserve banks with the intent of registering in concrete terms what regulation W is doing to their business.

The Business Trend

Defense and civilian demand for metalworking industry's products continues strong, keeping industrial activity steady at high level

INCHING STEADILY upward, the nation's military expenditures now account for about 12 per cent of total national output and promise to play an even greater role in the industrial production scene. Scattered signs of business uneasiness, brought on by materials shortages, price controls and conversion difficulties, are counterbalanced by the military budget which will have increasing impact on the economy as orders are translated into actual production. Defense needs will take 20 per cent of total output by June of 1952, as compared with a World War II peak of 45 per cent going to the military.

The steadying influence of military buying and continued high demand for civilian goods keep STEEL's industrial production index at a high level.

For the week that ended Apr. 28 the index stands at 217, a slight decline from the previous week's final mark of 221, but still near the record peak of 225, set in the week ended Feb. 24. In the week ended Apr. 29, 1950, the index was 198.

Steel Does It Again . . .

In the ninth successive week of operations above theoretical capacity, the steel industry in the week ended May 5 was scheduled to produce a new peak in output of ingots and steel for castings: 2,079,000 net tons. Former record was 2,069,000 tons produced in the week ended Mar. 31. The week ended Apr. 28 saw 2,065,000 tons turned out.

Autos Rolling To Record . . .

The first six months of 1951 may see a new record in automobile production, breaking the mark of 3,106,000 established during 1950. With schedules for May holding to high levels, the industry is almost certain to produce more than 3 million cars during the first six months of the year, says *Ward's Automotive Reports*. Combined production of cars and trucks in U. S. and Canadian plants for the week ended Apr. 28 was set at 163,883, as against the revised figure of 166,502 for the previous week. Assemblies in the Detroit area were disrupted little by the municipal transportation strike.

Buyers Tread Lightly . . .

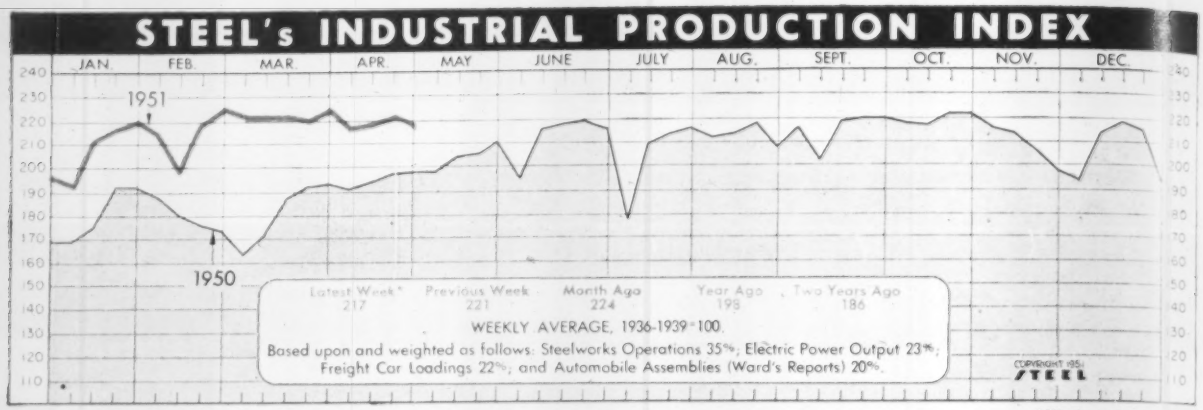
The second consecutive decline in new orders has been recorded in April, says the National Association of Purchasing Agents in tabulating results of its monthly business survey. Slack in new civilian business is indicated by the deluge of requests for subcontracting work on defense orders. Considerable open productive capacity soon will be available throughout the country, according to N.A.P.A. With orders down, prices shaky and uncertainty prevalent as to allowable production under the coming Controlled Materials Plan, purchasing agents are generally holding their buying commitments within 90 days.

Coal Catching Up . . .

A healthy gain over the previous week's bituminous coal production was recorded in the week ended

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	103.5	103.0	103.5	100.5
	Electric Power Distributed (million kilowatt hours)	6,674	6,730	6,767	5,902
	Bituminous Coal Production (daily av.—1000 tons)	1,761	1,662	1,687	1,898
	Petroleum Production (daily av.—1000 bbl)	6,100	6,144	6,041	5,015
	Construction Volume (ENR—Unit $1,000,000)	$284.7	$220.8	$414.9	$219.1
	Automobile and Truck Output (Ward's—number units)	163,883	166,502	184,494	148,274
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	760†	810	755	745
	Business Failures (Dun & Bradstreet, number)	162	151	136	186
	Currency in Circulation (in millions of dollars)‡	$27,122	$27,157	$27,038	$26,962
	Department Store Sales (changes from like wk. a yr. ago.)‡	+1%	+13%	+9%	+5%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$16,097	$16,664	$15,567	$13,441
	Federal Gross Debt (billions)	$254.7	$254.7	$254.9	$255.6
	Bond Volume, NYSE (millions)	$17.2	$16.0	13.6	$19.4
	Stocks Sales, NYSE (thousands of shares)	8,782	7,820	7,179	11,433
	Loans and Investments (billions)†	$69.8	$69.7	$70.4	$66.7
	United States Gov't. Obligations Held (millions)†	$30,750	$30,713	$31,198	$36,177
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.13
	STEEL's Nonferrous Metal Price Index‡	243.0	243.4	242.8	163.6
	All Commodities†	183.6	183.1	183.9	154.0
	Metals and Metal Products†	189.6	189.6	189.3	169.1
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1951
1950
Latest Week* 217
Previous Week 221
Month Ago 224
Year Ago 195
Two Years Ago 186
WEEKLY AVERAGE, 1936-1939=100.
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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*Week ended Apr. 28

Apr. 21. Output was estimated by the National Coal Association to be about 10,565,000 net tons, as compared with the prior week's total of 9,973,000 tons. Yield was below the corresponding week of last year—11,386,000 net tons—but 1951 production thus far is well over the amount produced in the comparable 1950 period.

Prices Nudge Record . . .

The tether of controls still leaves a little room for the weekly price index to roam. Average primary market prices advanced 0.3 per cent in the week ended Apr. 24 to 183.6 per cent of the 1926 average as boosts in prices of farm products and foods more than offset small drops in the fuels and chemical groups. The index is nearing the postwar peak of 183.9.

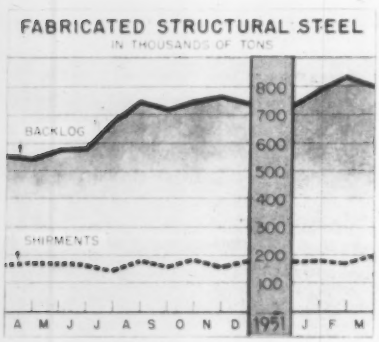
Comprehensive monthly wholesale price index for March reached a new all-time high of 184.0, advancing 0.2 per cent over the February level. Largest increases were in house furnishings, textiles and farm products.

New Plants Quadruple . . .

Engineering contracts for heavy construction amounted to $285 million in the week ended Apr. 26. This is 30 per cent over the corresponding week a year ago, reports *Engineering News-Record*. Public works make up $155.7 million. Private construction accounted for $129 million. Industrial building accounts for $65.7 million, and the year's industrial building total so far is 413 per cent above the comparable figure in 1950.

Moneymaking Year: 1950 . . .

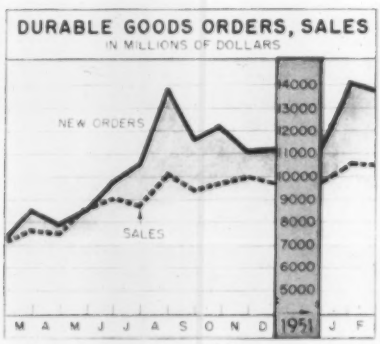
Manufacturers' profits before taxes showed a 61 per cent increase in 1950 over 1949, the Federal Trade Commission and the Securities and Exchange Commission estimated. Net income after taxes in 1950 was set at about $12.9 billion, or 43 per cent



Fabricated Structural Steel
Thousands of Net Tons

	Shipments 1951	Shipments 1950	Backlog 1951	Backlog 1950
Jan.	179.1	135.2	788	565
Feb.	166.9	129.6	830	565
Mar.	194.8	156.8	798	556
Apr.		164.4		540
May		168.1		578
June		172.1		580
July		141.6		684
Aug.		180.7		741
Sept.		157.0		716
Oct.		183.3		747
Nov.		167.1		763
Dec.		175.6		736
Total		1,931.5		

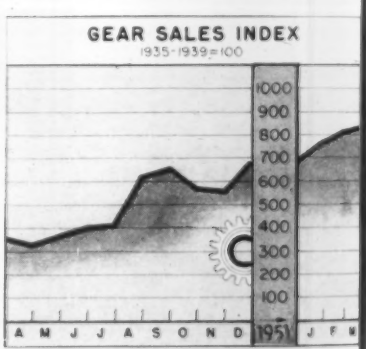
American Institute of Steel Construction



Durable Goods Orders, Sales
In Millions of Dollars

	New Orders 1951	New Orders 1950	Sales* 1951	Sales* 1950
Jan.	14,156	7,479	10,598	6,817
Feb.	13,773	7,213	10,516	7,103
Mar.		8,508		7,643
Apr.		7,857		7,488
May		8,514		8,605
June		9,814		9,030
July		10,553		8,670
Aug.		13,863		10,060
Sept.		11,500		9,392
Oct.		12,171		9,671
Nov.		10,621		9,730
Dec.		11,379		9,794

* Seasonally adjusted. U. S. Office of Business Economics



Gear Sales Index
1935—1939=100

	1951	1950	1949
January	764.6	280.2	320.7
February	809.1	272.9	282.3
March	830.7	358.4	299.1
April		328.6	339.0
May		363.1	250.1
June		401.0	227.8
July		410.7	193.1
August		617.4	262.0
September		654.5	224.9
October		564.8	242.3
November		554.9	230.7
December		680.4	242.8

American Gear Mfrs. Association

Charts—Copyright 1951, STEEL

more than in 1949. Higher net income and new income and excess profits taxes effective during the year boosted federal taxes to $10.4 billion in 1950, from $5.4 billion in 1949.

Sales in 1950 are estimated to have been 17 per cent above 1949 while costs and expenses rose only 13 per cent. Total assets of manufacturers at the end of the year were estimated at $126.3 billion and inventories were valued at $31.2 billion.

More Trailers Ride Roads . . .

More than twice the number of truck-trailers rolled off assembly lines in 1950 than in 1949. Total factory shipments of truck-trailers in 1950 amounted to 71,498 units valued at $248.6 million, a 109 per cent increase over the previous year's totals of 34,273 units valued at $119.1 million.

Jobs For All . . .

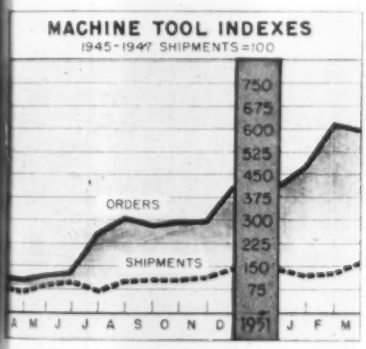
Nonagricultural job placements during March broke a postwar record for that month, set in 1946. The figure of 512,700 points up expansions in seasonal industries as well as continued hiring in defense production plants. March totals represented a 17 per cent increase over February; 194,000 of this number were women.

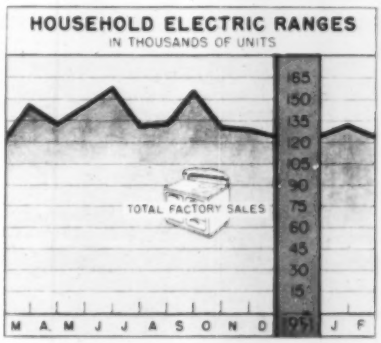
Trends Fore and Aft . . .

RCA-Victor is operating its radio-television plants on a hand-to-mouth basis. Layoffs while additional steel is sought from NPA or till the next month's allotment comes in are necessary . . . Sales of radio receiving tubes in March reached a new all-time high of 44,413,146 units, bringing first quarter sales to nearly 120 million . . . New housing starts in March were about 20 per cent below March, 1950. . . . Nearly $5 billion was added to manufacturers' backlogs in March. . . . Surprisingly good: home laundry appliances' first quarter sales . . . Half of Monarch Machine Tool Co.'s $16 million backlog has been acquired since Jan. 1 . . . The Federal Reserve Board's industrial production index rose during March to 222 per cent of the 1935-1939 average, up one point from January and February.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction Apr.30	Indus. Production...Apr.16	Refrigerators Apr.9
Employ., Metalwkg..Apr.2	Ironers Mar.26	Steel Castings Feb.26
Employ., Steel Apr.9	Malleable Cast. Mar.12	Steel Forgings Apr.30
Foundry Equip. Apr.23	Price Indexes Apr.2	Steel Shipments Apr.23
Freight Cars Apr.23	Pumps, New Orders..Apr.9	Vacuum Cleaners ..Apr.30
Furnaces, Indus. ...Apr.16	Purchasing Power ..Apr.23	Wages, Metalwkg. ..Apr.16
Furnaces, W. Air...Apr.9	Radio, TV Apr.23	Washers Mar.26
Gray Iron Castings.Mar.5	Ranges, Gas Apr.30	Water Heaters Apr.30





Machine Tool Indexes

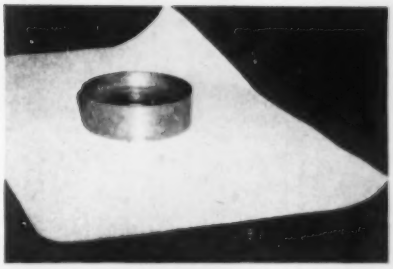
	New Orders 1951	New Orders 1950	Shipments 1951	Shipments 1950
Jan.	475.4	99.7	114.3	52.8
Feb.	615.5	89.2	123.8	56.1
Mar.	591.8	107.4	158.8	75.3
Apr.	....	98.9	....	61.6
May	....	116.4	....	82.5
June	....	124.1	....	91.9
July	....	253.1	....	68.3
Aug.	....	305.1	....	95.7
Sept.	....	280.6	....	101.6
Oct.	....	289.6	....	100.9
Nov.	....	291.9	....	110.9
Dec.	....	410.1	....	135.7

National Machine Tool Builders' Assn.

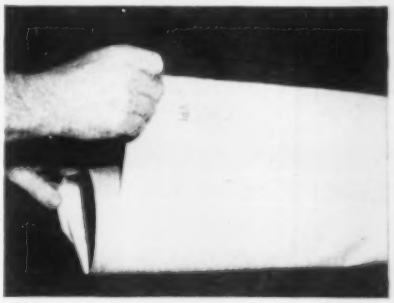
Household Electric Ranges
Total Factory Sales—Units.

	1951	1950	1949
Jan.	132,437	97,925	109,919
Feb.	123,953	118,989	88,333
Mar.	.....	145,417	88,934
Apr.	.....	132,859	60,739
May	.....	145,498	52,881
June	.....	158,534	69,107
July	.....	130,505	63,249
Aug.	.....	132,243	66,753
Sept.	.....	156,216	93,045
Oct.	.....	130,452	73,312
Nov.	.....	129,384	60,523
Dec.	.....	124,360	77,011
Total	.....	1,602,382	903,806

National Electrical Mfrs. Assoc.



Fork lift truck parts



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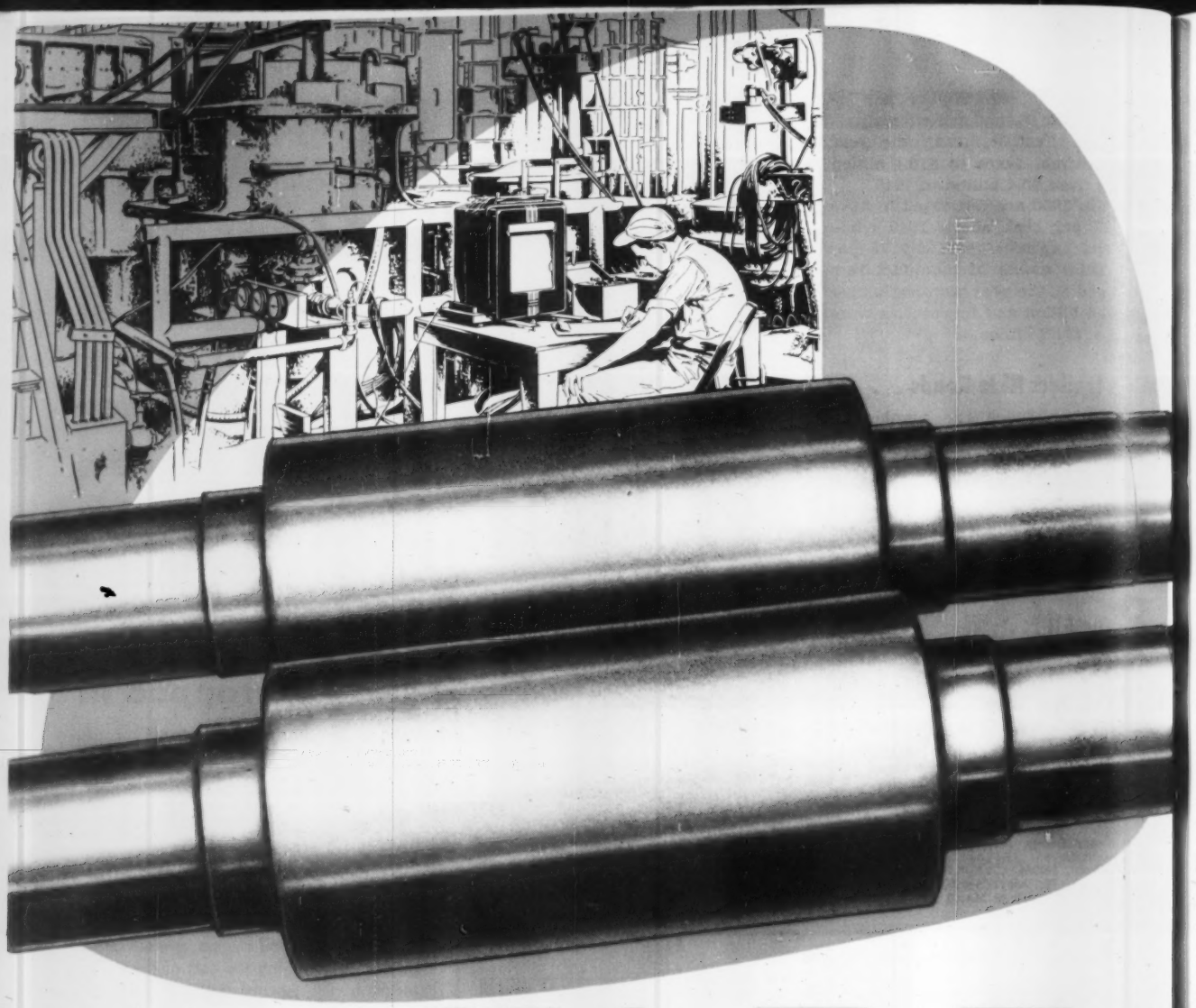

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THE OHIO STEEL FOUNDRY CO. LIMA, OHIO

PLANTS AT LIMA AND SPRINGFIELD, OHIO

Men of Industry

E. A. DUFFY
. . . V. P.-sales, Chandler-Boyd Co.

BRUCE A. DEAN
. . . Chase Brass V. P.-sales

LUKE E. SAWYER
. . . new president, Babcock & Wilcox

Chandler-Boyd Co., Pittsburgh, elected **E. A. Duffy** vice president in charge of sales. Mr. Duffy joined the company in 1946. He started as sales representative, advanced to manager of the valve department, assistant manager of sales, and manager of sales.

Midvale Co., Philadelphia, elected: Richard **T. Nalle,** president; **Lewis W. Metzger,** executive vice president; **A. R. Gaus,** vice president-sales; **A. O. Schaefer,** vice president-engineering and manufacturing; **Charles E. Acker,** secretary; and **Lloyd R. Loewen,** treasurer and assistant secretary. **Henry H. Ziesing** has retired as vice president of sales. **Mark W. Cresap Jr.,** vice president at Westinghouse Electric Corp., was elected a member of Midvale's board to fill an existing vacancy.

Robert J. Ryan was elected president of **Nooter Corp.,** St. Louis, to succeed the late **Elmer J. Nooter.** Mr. Ryan was formerly executive vice president, and has been associated with the firm since 1923.

L. W. Mercer was elected to the new executive vice president post of **Square D Co.,** Detroit. Formerly vice president and general manager, switch and panel division in Detroit, he will now assume overall responsibility for direction and co-ordination of the company's sales, engineering and production activities. **F. H. Roby** was elected vice president in charge of sales and director. **L. G. Maechtlen** was also elected a vice president and director, and will remain at the western division headquarters in Los Angeles.

Bruce A. Dean was elected vice president in charge of sales of **Chase Brass & Copper Co. Inc.,** Waterbury, Conn., subsidiary of Kennecott Copper Corp. He was formerly general sales manager of Mengel Co. Inc. **Sherman H. Perry** continues as vice president of Chase Brass & Copper until retirement at the end of July.

Thomas A. Willson Jr. was elected vice president of **Willson Products Inc.,** Reading, Pa. He continues as assistant secretary, a position he assumed in 1947.

Harry E. Lewis was promoted to the newly created position of general sales manager of the industrial sales department, Perlite Division, **Great Lakes Carbon Corp.,** New York. He was manager, product development department, building products division.

H. H. Bunchman, treasurer, and **V. P. Rumely,** vice president, **Crane Co.,** Chicago, were elected directors. **S. M. Roberts,** president of C. A. Roberts Co., was also added to Crane's board. Changes made in the executive personnel include: **E. E. Wyatt** and **L. L. Hill,** made executive assistants; **P. L. Yates,** made assistant comptroller succeeding Mr. Wyatt, and **K. L. Karr,** elected secretary succeeding Mr. Yates. In the sales division, two new vice presidents elected are **C. T. Pollock** and **F. F. Elliott.**

National Supply Co., Pittsburgh, appointed **George J. Reilly Jr.** as plant controller at the Etna, Pa., plant of the company's Spang-Chalfant Division. He replaces **E. F. Thayer,** resigned.

Four changes in executive officers of **Babcock & Wilcox Tube Co.,** New York, include: **Luke E. Sawyer,** formerly executive vice president, elected president; **Alfred Iddles,** formerly president, becomes chairman of the board; **Isaac Harter,** formerly chairman, was named a consultant to the company; and **Edward A. Livingstone,** vice president assigned to sales, was given broader organizational responsibilities.

L. W. Matthey was elected vice president and assistant general manager, **Key Co.,** East St. Louis, Ill., and **F. B. Riggan** was elected vice president in charge of research and development.

Morse G. Dial was elected executive vice president of **Union Carbide & Carbon Corp.,** New York. Since 1949 he has been director, vice president and treasurer. **Dr. George O. Curme Jr.** was elected vice president in charge of research. He has been vice president in charge of chemical research for the corporation, and for many years was a vice president of Bakelite Co. and Carbide & Carbon Chemicals Co., both divisions of Union Carbide.

Timothy F. Murphy was elected president of **Continental Diamond Fibre Co.,** Newark, Del. He succeeds the late **Norris N. Wright.**

Harold L. Zimmer was appointed advertising manager, **Curtis Mfg. Co.,** St. Louis.

Fred H. Spenner, formerly vice president in charge of mechanical engineering, is now vice president and

executive assistant to the president of **Scullin Steel Co.**, St. Louis.

William C. Fork was elected vice president, **Acme Steel Co.**, Chicago, and **Fred M. Gillies,** executive vice president, was elected to the board of directors. Mr. Fork has been works manager at the Riverdale plant, and a director of the company since 1949. He joined the company in 1908. He became works manager in 1947.

E. T. Asplundh was named president of **Southern Alkali Corp.**, subsidiary of Pittsburgh Plate Glass Co., Pittsburgh. **Clarence M. Brown,** board chairman of Pittsburgh Plate Glass, was named chairman of Southern's board of directors, a newly created position.

National Tool Co., Cleveland, appointed **Austin F. Logan,** Buffalo, as agent for western New York state.

Edmund F. Ball, for the last three years president of Ball Bros. Co., was elected to the board of directors of **Borg-Warner Corp.**, Chicago, to succeed **George A. Ball,** his uncle, who retired.

Charles P. Culhane was appointed general sales manager, United Motors Service, division of **General Motors Corp.**, Detroit. He succeeds the late **L. W. Martin.**

A. F. Reinking, formerly assistant sales manager, was named manager, steam turbine sales division, **Worthington Pump & Machinery Corp.**, Harrison, N. J. He will make his headquarters at the Wellsville, N. Y., plant.

Gene Heller was appointed to direct sales and advertising for **Diamond Machine Tool Co.**, Los Angeles. He

SEWARD T. SALVAGE

Elected advertising manager, Timken Roller Bearing Co., Canton, O. Noted in STEEL April 16 issue, p. 65

was a former partner of Heller Machinery Co., established over 30 years ago, and previous to that was with Pacific Machinery Co., both of Los Angeles.

Norton Co., Worcester, Mass., has transferred three of its abrasive engineers. **Sidney B. Wetherhead,** previously covering Maine, New Hampshire and Vermont, was assigned to the eastern Massachusetts territory to assist **Raymond J. Forkey,** abrasive engineer in that area. **Charles A. Babbitt,** formerly serving North Carolina and Virginia, takes over the territory formerly covered by Mr. Wetherhead, and is succeeded in the South by **Richard D. Burdette.**

John P. Kelsey was elected an assistant treasurer of **Sharon Steel Corp.**, Sharon, Pa.

Chain Belt Co., Milwaukee, elected **L. B. McKnight** to the newly created position of executive vice president. Mr. McKnight served in various managerial capacities since joining the company in 1927, and has been vice president and director since 1948.

D. K. McIlvaine was appointed to the staff of **Powdered Metal Products Corp. of America,** Franklin Park, Ill., as manager of its electronics division.

W. C. Stolk, executive vice president, **American Can Co.**, New York, was elected president to succeed **C. H. Black,** who becomes chairman of the board. **D. W. Figgis,** with the company almost 50 years, retired as chairman but continues in an advisory capacity and as a director.

Stuart H. Levison was elected vice president in charge of zinc and coal operations, **American Smelting & Refining Co.**, New York.

E. W. Ritter, manager of the electronic tube division, **Westinghouse Electric Corp.**, Pittsburgh, was elected a vice president. **E. V. Huggins** was elected executive vice president of Westinghouse Electric International Co., the foreign trade subsidiary of Westinghouse. **William G. Marshall** is retiring. He has been vice president in charge of industrial relations at Westinghouse.

J. W. Hepplewhite has been added to the staff of **Ferro Enamel Corp.**, Cleveland, and will be connected with the glaze frit division of the company. He was with Edwin M. Knowles China Co. as research director.

A. Charles Amann succeeds **Meade Johnson** as general sales manager, Stamford Division, **Yale & Towne Mfg. Co.**, Stamford, Conn. He formerly was industrial sales manager, which position he assumed upon joining Yale & Towne in 1949. He pre-

GENE HELLER

. . . Diamond Machine sales and adv. mgr.

L. B. McKNIGHT

. . . exec. V. P. at Chain Belt

A. CHARLES AMANN

. . . head sales, Yale & Towne Stamford div.

HERMAN A. BOTTENHORN
. . . chief engineer, Loewy Rolling Mill

CARROLL L. WILSON
. . . directs dept. of Climax Molybdenum

W. F. TUTTLE
. . . Armco's chief engineer

viously was with Illinois Lock Co. as vice president.

Herman A. Bottenhorn was appointed chief engineer of **Loewy Rolling Mill Division,** Hydropress Inc., New York. He has held similar positions with other rolling mill concerns, and has been a collaborator of Erwin Loewy, president of Loewy-Hydropress.

Howard A. Kreith was appointed purchasing agent, **Dearborn Chemical Co.,** Chicago.

J. K. Smit & Sons Inc., Murray Hill, N. J., elected **Pieter Smit** as president. He was secretary-treasurer.

Dr. Charles A. Thomas was elected president, **Monsanto Chemical Co.,** St. Louis, to succeed **William M. Rand,** retired. Dr. Thomas was executive vice president, chairman of the executive committee, a director and member of the finance committee.

Ralph E. Knight, assistant general manager in charge of the chemical division of **Kaiser Aluminum & Chemical Corp.,** Oakland, Calif., was named to two additional positions—vice president of Kaiser Magnesium Co. and Kaiser Bauxite Co., subsidiaries of the corporation.

Climax Molybdenum Co., New York, announces formation of an industrial development department and appointment of **Carroll L. Wilson,** formerly general manager of U. S. Atomic Energy Commission, as director.

Fred T. Roberts was made manager of truck, bus and trailer wheel sales, **Budd Co.,** Detroit.

Charles S. Jarmon was appointed controller, **Riverside Metal Co.,** Riverside, N. J., to replace **George Ebert.**

Arthur B. Kinley and **Waye L. Smith** were named general machinery division sales representatives for **Allis-Chalmers Mfg. Co.** Mr. Kinley is assigned to the Spokane, Wash., office, and Mr. Smith is with the Denver district office. **John Wiehe** and **Walter Wenzel** were named heads of a new plant engineering and planning department at the Norwood, O., Works.

Francis J. Myers was elected a director of **Alan Wood Steel Co.,** Conshohocken, Pa., to succeed **Thomas C. Egan.**

Alexander Gabay was appointed assistant to the president of **Wooldridge Mfg. Co.,** Sunnyvale, Calif., manufacturer of earthmoving equipment.

W. F. Tuttle was appointed chief engineer of **Armco Steel Corp.,** Middletown, O., to replace **E. N. Millan,** who asked to be relieved as the active executive head of the engineering division. Mr. Millan will continue with the company in a consulting and advisory capacity on engineering problems.

Ralph H. LeBow has joined **Parker Appliance Co.,** Cleveland, as staff engineer for aircraft fuel system components.

J. Cameron Argetsinger has resigned as vice president, **Youngstown Sheet & Tube Co.,** Youngstown, a position he had held for 15 years. He continues in a consulting capacity.

Changes involving personnel of the factory service organization of **Cummins Engine Co. Inc.,** Columbus, Ind., include: **Charles C. Sons,** appointed acting eastern service manager, with headquarters in Columbus. **Dillard B. Davis,** formerly eastern service manager, now is regional service representative in the central region, with headquarters in Chicago. Mr. Davis replaces **Lloyd Kerber, recently** resigned to accept the position of general service manager for Cummins Diesel Sales Corp. of Missouri, St. Louis.

OBITUARIES...

Edward M. Murphy, 55, associated for 30 years with **American Steel & Wire Co.,** subsidiary, U. S. Steel Corp., Cleveland, and for the last ten years chairman of the Wire Committee, died Apr. 27.

Duncan Robertson, a former superintendent of the west mill of Canada Works, **Steel Co. of Canada,** Hamilton, Ont., died Apr. 21. He was with the firm 47 years before retirement.

Elmer J. Nooter, 42, president, **Nooter Corp.,** St. Louis, died Apr. 14.

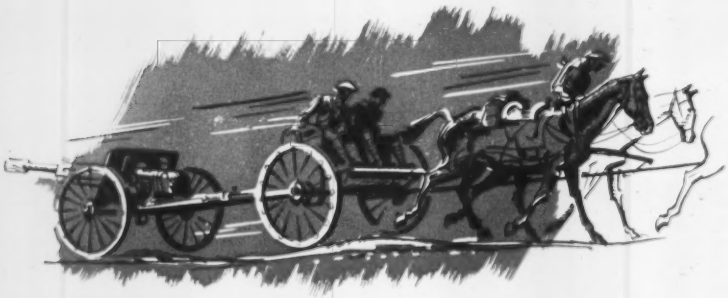
D. P. Reed, president, **Kanawha Mfg. Co.,** Charleston, W. Va., died Apr. 18.

William T. Bell, 61, manager of distributor sales, mechanical goods department, **Goodyear Tire & Rubber Co.,** Akron, died of a heart attack Apr. 22 in Houston.

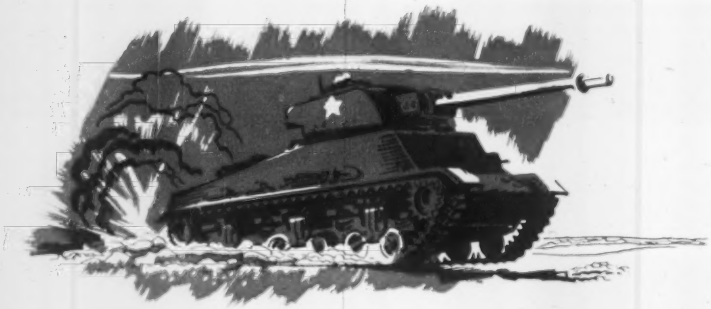
Peter P. Evans, 81, former president of **Osborn Engineering Co.,** Cleveland, and associated with that organization for 42 years, died Apr. 25.

Arthur G. Ross, 64, treasurer of **Dominion Chain Co.,** Niagara Falls, Ont., died Apr. 25. He had been with the company since 1918.

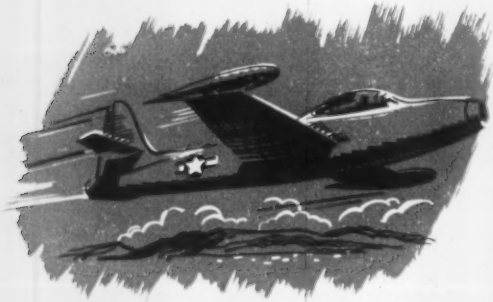
IN 1918 ——— *We WELDED steel rims for ARTILLERY CARRIAGES*



IN 1941 ——— *We WELDED steel turret rings for ARMORED VEHICLES*



IN 1951 ——— *We're WELDING stainless steel rings for JET AIRCRAFT ENGINES*



We are again engaged in an important part of our nation's defense program. Because *RESEARCH* has never stopped at American Welding, we have the "know-how" and the "know-why". Today, through this continuing welding research, we're in a position to help you with your present or new products where designing or engineering is required.

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Production AND Engineering
NEWS AT A GLANCE

NITROGEN-BOOSTER—Large quantities of calcium cyanamid 6-16 are being used currently by steel companies for increasing nitrogen contents of open-hearth and electric furnace heats, for the purpose of grain refinement and improving strength, hardness and wear resistance. Tin plate producers are the largest consumers, having found the material valuable for boosting temper hardness with a minimum of cold rolling. The identification 6-16 refers to the mesh size of the chemical, normally used as a ladle or runner addition. Calcium cyanamid has a nitrogen equivalent of 24.3 per cent, and average nitrogen recovery is about 20 per cent. Addition of 0.45-pound per ton increases nitrogen 0.001 per cent. Suppliers pack the chemical in 25-pound paper bags which are shipped seven to a steel drum. The only systemic effects noted following excessive absorption of the compound are a flushing of the skin, accompanied by headache and dizziness, when alcohol is ingested following such an exposure, a condition commonly referred to as cyanamid flush or by the French as mal rouge. It is a transient syndrome, never persisting longer than two or three hours.

STRONGER ALUMINUM RIVETS—New high-strength aluminum alloy XA78S which Alcoa has introduced experimentally (first mentioned in this department Feb. 5) for aircraft applications where its 10 per cent improved tensile strength over 75S alloy can be used to advantage, is joined by another alloy XB77S. The latter is for use in rivets in the large-size range, attaining an average shear strength of 38,000 psi within two weeks after driving. It can be hot driven by hand pneumatic hammers, heating range for driving being 850-975 °F. Characteristics suggest possibilities in the replacement of steel rivets in aluminum structures such as bridges and railroad cars.

BASIC ARMOR SPECS—A principal supplier of homogeneous rolled armor plate holds to the following basic analysis: Carbon 0.20-0.30 per cent, manganese 1.55-1.95, silicon 0.10-0.30, molybdenum 0.40-0.55, sulphur 0.040 max., phosphorus 0.040 max. When plates are over 1 inch thick, the entire carbon range is raised two points and manganese is adjusted upward ten points to give the same degree of hardenability as thinner plates. No boron is used for hardenability improvement.

FIGURING POLLUTION EFFECT—In considering the dumping of waste plating solution, a metal industry advisory group reasons as follows: Supposing a tank with 100 gallons of cyanide solution is to be dumped. Strength of the solution is only 5 ounces of cyanide per gallon, weak in terms of plating. Next suppose this tank is located in a state where the permissible limit for cyanide dumping is 0.10 parts per million. For 100 gallons of solution, some 37.5 million gallons of water would be needed to dilute to 0.10 ppm. That is enough water to cover a football field to a depth of 105 feet. The obvious answer is to save the solution by purification.

RUGGED ROOFS—Over the past nine months, 39 companies have made installations of "zebra" roofs—alternate courses of silica and basic brick—in 310 of the country's 947 open-hearth furnaces. Several arrangements are used in laying up the brick, some plants using keys, some wedges; some mounting the adjoining rows flush and some setting the basic brick about 1½ inches out from the silica at the fireface. Mixed operating opinion is reported, with increases up to 41 per cent observed in the number of heats per campaign. p. 126

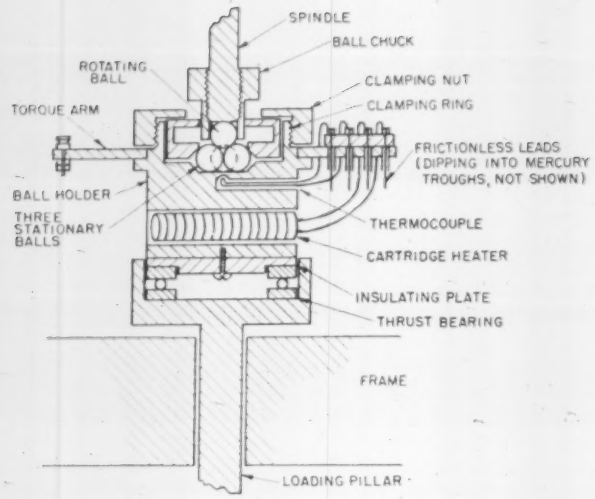
MOUNTING GRINDING WHEELS—Proper installation of sleeve-mounted wheels on cylindrical grinding machines, to avoid breaking the wheels or springing flanges, is principally a function of the care exercised in tightening up the flange screws, after paper blotters have been inserted between the wheel and sleeve. Diametrically opposed screws should be drawn up slowly around the flange to 15 ft-lbs on a torque wrench, and a further check on the torque should be made after 8-16 hours of operation. p. 122

DRAWING LUBRICANTS REVIEWED—Choice of proper lubricants for drawing, hot or cold forging, stretching and extrusion of carbon steel, stainless steel, nickel alloys, copper, magnesium and aluminum becomes rather complicated in view of the variety of water-base, oil-base and solid materials available and the different techniques developed for their application. It is possible to group elementary factors to facilitate choosing the best lubricant which may often be the difference between a good forming job and scrap. p. 116

SHAKEUP IN PAINT—Olive drab enamel is called one of the "most disappointing" coatings of the last war, lacking two most important characteristics—durability and color retention. Since camouflage enamel is so important, Ordnance now has formulated nearly 100 different lusterless olive drab compositions and is giving them the business at the Sierra Ordnance Depot, where extremes of temperature and sand storms are frequent. Specialists think another year of exposure will turn up the answers. —*A.H.A.*

For Best Forming
Use the

By E. L. H. BASTIAN
Senior Engineer
Shell Oil Co.
New York



Section view of four-ball wear testing machine and four-ball assembly. Studies made on this machine show that low friction and low wear do not necessarily occur simultaneously

FRICTION reduction and prevention of wear, welding, and metal seizure are the cardinal attributes of a good lubricant for forming metals. The shop man knows that there are other things which the lubricant must also do if it is to be considered for practical use.

Functionally, the lubricant must sometimes act as a coolant. The circulatory use of water-based fluids in progressive-die sets and of oil-type fluids in hot forging aids in maintaining die surface temperatures within optimum limits for the particular job. This prevents premature die deterioration from overheating, checking and cracking, and helps to hold size on the work. For some hot-forming jobs, of course, cooling as a function of the lubricant is not practicable.

In the hot-forming of metals such as magnesium, another operating function of the lubricant becomes important. This is the deposition of an inert solid material upon the metal surfaces to cushion and separate work from dies. Being inert to the necessary high temperatures, having low frictional properties to facilitate work motion in the dies, and being by nature relatively noncompressive to cushion and prevent excessive metal-to-metal contact, such solid lubricants serve a useful purpose.

Beside functional utility, metal-forming lubricants should also have certain service characteristics as follows: (1) Prevent corrosion or staining of work, dies, and machine elements; (2) be convenient to handle and mix (if plant mixture with water, oils, or other fluids is required), and to apply; (3) be stable in service; (4) be readily cleaned from workpieces, where such cleaning is required; (5) be nontoxic and otherwise harmless to workers; (6) be economical for use.

Three Types of Fluids—Three groups of metal-forming lubricants have been found practical. These are water-based fluids, oil-based fluids, and solid lubricants. The water-based fluids usually consist of either aqueous solutions, emulsions or simple dispersions. Some fluids are predominantly coolants although their lubricating value, especially when used by precoat methods of application, can be considerable.

The oil-based fluids vary widely from simple light mineral oils to heavily compounded, chemically active fluids. They are essentially lubricants and, dependent upon composition, are capable of meeting practically all requirements of friction reduction, antiwear, and antiwelding.

Solid lubricants may be either organic or inorganic solids. The latter are either mineral or metallic. A broad range of these materials is suitable and available for use in metal forming.

Press Drawing—Aqueous lubricants, oils, and solids are all used in press drawing, sometimes singly, sometimes in combination. For carbon and low-alloy steel drawing, a pigmented paste-type lubricant is used. However, for blanking, stamping, and shallow drawing a nonpigmented water-based fluid or an oil may be employed. The paste-type compounds are diluted with from one to five parts of water and applied by swab, dip, wiper, roll or spray method to the blanks before drawing.

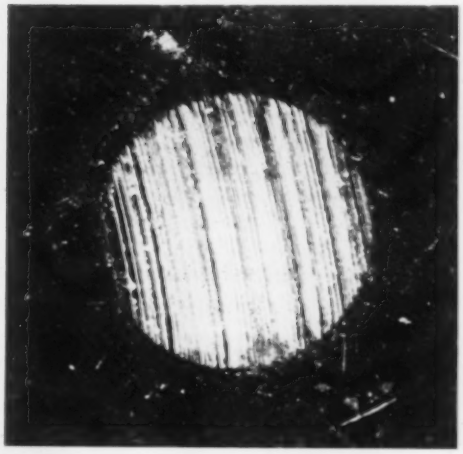
Nonmetallic phosphate coatings preapplied to steel blanks for drawing are obtained with a hot (150 to 200°F) phosphate salt and acid solution either spray- or dip-applied to the previously cleaned metal. This undercoating prevents metal-to-metal contact of work and dies and serves as an adherent retaining base coat for the subsequently applied compound or drawing oil.

Chemically Active Oils for Stainless—For stainless steels and other high alloys, chemically active oils and compounds are generally more satisfactory. Chlorinated oils are increasingly used for such drawing, even though they require a solvent degrease for subsequent cleaning from the drawn parts. The most effective cleaning agent in such cases is trichlorethylene. Work to be annealed should always be cleaned.

Castor oil, tallow and compounded mineral oil blends of these fatty oils are used for the press drawing of nickel and high nickel alloys such as Monel and Inconel. In general, the nickel-chromium alloys require somewhat more attention to lubricants than

Results Right Lubricant

Lubricants used in press drawing, hot and cold forging and hot and cold extruding can mean the difference between very successful and mediocre forming practice. Here are some practical tips for selecting lubricants to facilitate forming of carbon and low-alloy steels, stainless, copper and brass, magnesium and aluminum



Photomicrograph of wear scar on lower ball at loads below the point of seizure. Two-hour test at 15 kg load; 50X. From Larsen, *Lubrication Eng.*, 1945

does ordinary ferrous work. This is especially true for the so-called Nimonic-type alloy containing about 80 per cent nickel and 20 per cent chromium. Mineral-fatty oils incorporating either low-cleavage-type solid fillers or chemically active components such as chlorinated oils are useful for drawing such work.

Since the high-nickel materials do not ordinarily form the thin oxide films characteristic of steel, and which serve to aid in boundary lubrication conditions necessary in drawing, it is necessary to use substances which will form an adherent coating on the work metal, either solid or chemical, to avoid metal-to-metal contact and galling. With these metals, higher hold-down pressures are required to minimize wrinkling, and lower ram speeds to allow the metal to flow, to eliminate springback, and to hold close dimensional limits on drawn pieces.

Where chemically active drawing lubricants are employed, thorough cleaning in a degreasing fluid is necessary before annealing in order to prevent any unwanted chemical or metallurgical effects.

For Copper Alloys: Water-Based or Oil Blends — Copper and brass press drawing is accomplished with either water-based emulsions or mineral-fatty oil blends. The emulsions are similar to those used in steel press drawing except that the free fatty acid is kept low to avoid excessive straining of the work metal. Soap-fat paste compounds, mixed with water, can be controlled to give the desired emulsion concentration for any particular job. Usually from three to five parts of water per part of compound are satisfactory.

In heavy cupping draws, pigmented compound slurries containing about 5 per cent to 10 per cent of inorganic minerals such as clay, talc, mica, etc., provide the necessary cushioning and separation of die and work surfaces.

Where oil is used to press-draw copper or brass, chemically inactive mineral lard and tallow blends have the advantage of "oiliness" without staining the work surface. The more chemically powerful chlorinated and sulphurized oils used for steel press drawing are not usually required for drawing copper alloys.

Dry soap coatings are effective drawing lubricants for both ferrous and nonferrous metals. Application is by precoating blanks with a hot aqueous solution of soap, and then air or oven drying to leave a thin, dry, hard clean coating on the metal.

Waxy, wax-fatty and plastic coatings preapplied by the use of a solvent vehicle or by hot application and subsequent cooling are other types of effective drawing lubricants.

Magnesium Drawn Hot — Magnesium is usually formed and drawn hot to utilize the ductility of the metal at higher temperatures (450 to 700°F) for forming purposes. The most satisfactory drawing lubricant under such conditions is a colloidal dispersion of graphite in a light naphtha vehicle. Upon application, the naphtha flashes off, leaving an adherent graphite film on the metal surface. This film is inert at elevated temperatures and has low friction characteristics under high unit pressures. This is explained by the flat plate-like structure of the graphite and its ability to become oriented on the metal surface to permit ready cleavage and slip in shear.

Magnesium alloys have been deep drawn experimentally at ambient temperature. This is accomplished by intermittent application of successively higher deformation loads instead of the usual continuous increasing loading used commercially. By this method the drawability of magnesium plus 1.5 per cent manganese alloy (variously designated as AM_1S, Dow "M" and M-1 alloy) has been increased from 25 per cent (by commercial operation) to about 40 per cent.

For lubrication of the blanks in the low temperature intermittent process, a mineral-bodied grease is satisfactory from the standpoint of both drawing and cleaning. Graphite, when used, embeds itself in the surface of the metal and is difficult to clean off.

Aluminum Uses Oil or Water-Based—Press draw-

ings of aluminum may utilize either oil-type or water-based lubricants. Those aluminum alloys containing copper and magnesium, such as 24S and 52S grades, are liable to water-stain at ordinary temperatures and may be preferably drawn with oil-type fluids to prevent it. Water stains are caused by minerals in the water forming inorganic white metallic salts in the otherwise colorless oxide film on the aluminum surface. They can be removed by either mechanical abrasion or by etching solutions which also remove the oxide film. Purer aluminum, such as the 2S and 3S grades, seems less likely to water-stain than the alloys. This is also true of clad sheets.

Aqueous drawing lubricants, where used, are ordinarily of the emulsion type containing a reasonably high free fatty acid (3 to 10 per cent) to aid in "wetting" the metal surface and avoiding the surface attack generally experienced with alkaline solutions. The emulsion may be made from either soap-fat paste-type compounds or from mineral soluble oils containing fatty oil additions. Usually, from four to five parts of water per part of neat lubricant are mixed to prepare the emulsion.

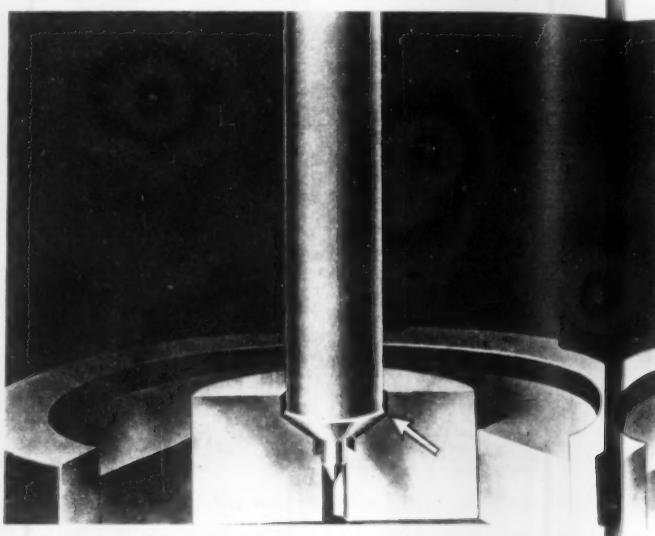
Blends Utilized—Oils, both straight mineral and compounded mineral-fatty or soluble blends, are utilized for deep drawing aluminum and its alloys. Blends of fatty oils, such as lard oil, degras, or tallow, with light-viscosity mineral oil or kerosene, are the most commonly encountered lubricants in drawing of the common alloys.

For deep heavy draws and cupping operations on high tensile alloys, heavier-bodied lubricants, containing a higher proportion of fatty material, and sometimes incorporating soaps and chemically active compounds, are required. Cleaning of such lubricants can usually be done by naphtha, kerosene, or solvent fluids and degreasers. Strong alkaline aqueous cleaners should not be used as they may attack the metal surface resulting in a rough unsightly appearance and causing difficulties in subsequent draws, if required.

Either emulsion or oil-type drawing lubricants are suitable for cold stretch-forming aluminum. The emulsion types are usually made up from pigmented drawing compounds in order to secure the cushioning effects of the solid fillers. They may consist of talc, clay, carbonates, mica, chalk, etc.

Inert Lubricants Useful — Ordinary calcium-base greases, hard yellow naphtha soaps and compounded heavy cylinder stock oils are also used for stretch-forming aluminum over steel dies. Where the work metal is heated, say above 400° F to facilitate forming, relatively inert lubricants must be used to lubricate and to prevent forming resinous, gummy deposits on the work surface. Although hard yellow soap has been used for this purpose, graphite suspensions are more suitable for high-temperature forming despite the cleaning problem.

Where nonmetallic dies, such as plastic dies, are used for cold-forming aluminum, no lubricant is needed because of the low friction characteristics between the two materials.



Beginning of impact extrusion of aluminum slug

Sometimes a rubber pad between die and work is used in stretch forming aluminum. The rubber pad stretches and moves with both metal surfaces to provide required cushioning and prevent metal-to-metal contact.

For rubber-pad forming work, such as Marforming, the use of a soft neutral potassium soap, evenly applied to the work blank, has been found effective as lubricant. The soap may be applied by predip in a hot aqueous solution and drying, or by brush, or spray application. If adequately neutral, neither too

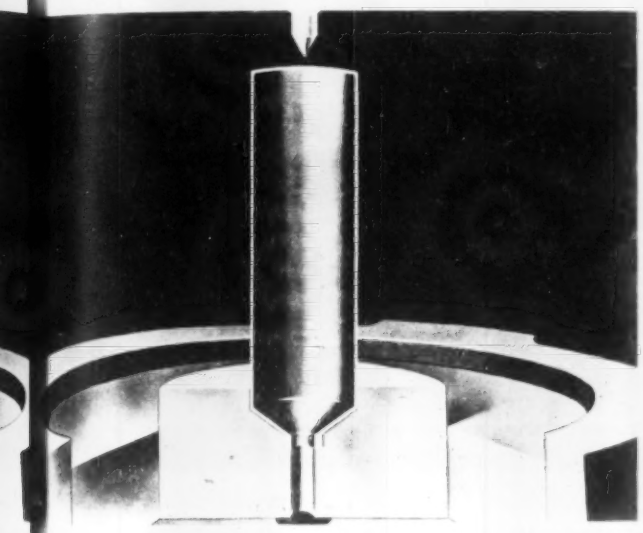
DRAWING OIL AND COMPOUND RECOMMENDATIONS

Drawing Operation	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum	Copper and Brass	Bronze Alloys	Nickel Alloys
Blanking and Stamping	A, E 6	B, E 6	D	E 6	A, E 6	F 6	B, C
Shallow Press Drawing	E 4	F 4	D	E 4	B, E 4	F 4	B, C
Deep Draw (Cold)	..	F 1	D	C, E 3	C, E 3	F 3	B, C
Deep Draw (Hot)	..	..	..	G *	..	..	..
Heavy Cupping	F 2	F 2	D	C, E 2	F 2	F 2	C, D

Description of Drawing Lubricant Recommended
A—Drawing Oil—straight mineral S.S.U. 100 to 300 @ 100° F.
B—Drawing Oil—mineral—fatty oil blend
C—Drawing Oil—straight fatty oil
D—Drawing Oil—sulfurized or chlorinated oil
E—Emulsion—soap-fat compound (Note 1)
F—Emulsion—pigmented soap-fat compound (Note 1)
G—Solid—graphite in light vehicle (petroleum)
*—Also applicable for hot draw of magnesium
NOTE 1: Suffix number following recommendation indicates water dilution to be used. Thus: E 4 is a mixture of 1 part compound to 4 parts of water for use.

acid nor alkaline, the soap will have no detrimental effects on the rubber pad. A blend of light mineral oil and neutral lard oil has also proved satisfactory for Marforming both steel and aluminum at ambient temperatures.

Lubricants for Forging—Hot and cold forging of metals both require die lubricants to aid in prevention of excessive die wear and to facilitate proper flow of the work metal over the die surface. Proper die lubrication is particularly important in the forging of high nickel alloys, such as Monel and Inconel, and of nonferrous metals such as aluminum and mag-



End of impact extrusion of slug into tube

nesium. These metals have a tendency to stick in the dies unless suitable lubricants are used.

In hot forging, heat of the work affects the die in direct relation to the time of contact. As a result, heating effects are usually greater in the lower impression die in which the forging rests. Frequent application of the die lubricant helps to hold die temperatures in a general range of 400 to 600°F.

The second function, that of controlling the metal flow over the die surface, is related to the lubricant's ability to furnish extreme boundary lubrication under conditions of high pressure and high temperature.

Hot Forging Lubricants — While ordinary heavy fuel oils, black oils, or cylinder oils are sometimes applied to hot forging dies as a lubricant, the value of these for the purpose is somewhat limited, unless used in conjunction with an inert solid filler such as graphite. At ordinary forging temperatures, the oil constituent or vehicle burns off quickly leaving behind a graphite coating to protect the dies and supply solid lubrication during operation.

Graphite suspensions or graphited lubricants of one kind or another, are commonly used in both hammer and press forging of ferrous and nonferrous metals. With flake or amorphous graphite, the average amount used is 10 to 20 per cent in a suitable oil or other fluid vehicle. Fine flake graphite leaves much less abrasive ash on dies than the amorphous type and is preferred to minimize die wear. By the use of fine colloidal graphite dispersions (from 2 to 5 per cent), "ashing" and other die deposits from the lubricant are even further minimized.

Applied Three Ways—There are essentially three basic methods for applying hot forging die lubricants. Upon the choice of application depends the nature of oil or fluid in which the graphite is suspended. These methods are direct swab, direct spray and pretreatment.

Swab type graphited lubricants usually utilize heavy fuel oil, black oil, or heavy cylinder stocks, having a viscosity about SSU 150 at 210°F. Some cylinder stocks have flash and fire points well above 600°F so that upon application to the hot dies, they do not burn off immediately and thus provide maximum cooling and protection to the die. Practically all heavy swab type lubricants smoke quite badly, which may or may not be objectionable dependent upon ventilation facilities. Since these oils do not flash off, some lubricant is entrapped between the die and forging, where it volatilizes and creates pressure to force the forging out by "diesel action" and also serves to blow out scale and die deposits.

Spray type lubricants for steel forging are usually made up with light-viscosity neutrals or black oils plus the graphite constituent. Having low fire points (about 300°F), the oil vehicle burns off immediately upon application, leaving the graphite film on the die surface.

For hot hammer forging of aluminum, beeswax and other waxes have been found suitable. However, at the relatively low forging temperatures (700-800°F) they smoke excessively and are objectionable on this account.

For hot press forging of both aluminum and magnesium, graphite dispersions in naphtha have been used. Upon application, the naphtha flashes off, leaving the graphite coating behind. If too heavy an oil vehicle is used in this class of work (forging temperatures 700-800°F), it may not burn off cleanly, leaving objectionable gummy or resinous deposits on the die surface and causing "sticking." While efficient for the forging operation, graphite tends to embed in the aluminum and magnesium surfaces, creating a difficult cleaning problem. Unless removed, such embedded particles lead to subsequent pitting and corrosion.

Cleaning usually is done by abrasion or alkaline cleaners. Where the latter method is used, immersion time must be brief and followed by a water rinse and acid neutralizer to prevent alkaline attack on the forging surface.

Pretreatment of dies, forging tools, and punches is accomplished by application of an aqueous dispersion of colloidal graphite to the parts, previously cleaned by solvent degreasing with trichlorethylene, and heated to about 300°F. The application may be by brush or spray. Small parts can be dipped, but should be withdrawn quickly so that the retained heat will drive off the water and leave a dry graphite film on the tool or die surface. (*Please turn to Page* 130)

From data presented by the author at the 19th annual meeting, American Society of Tool Engineers, New York, Mar. 15-17.

Molded Plastic and Fiberglass CONSERVE METALS in Washing Machines

FIBERGLASS-REINFORCED resin of the styrene polyester type, laminated and molded, has been developed as an eminently-qualified production alternate for aluminum and Monel metal in various parts for dish washing and clothes washing machines manufactured by Apex Electrical Mfg. Co., Cleveland. In addition to easing pressure on critical metals requirements, the change has meant no particular sacrifice of quality or performance and at the same time has permitted cost reductions up to 50 per cent, in the case of one outer shell for a two-part basket of a clothes washing machine, formerly built up from 28 separate aluminum components—cast, rolled and drawn.

Fiberglas, an Owens-Corning trade designation, has tensile strength by itself of 270,000 psi; that is, each individual glass fiber has this indicated tensile. The resin, when cured, shows tensile of 4000 psi. The two together, properly mixed and processed, form a structural product with tensile of over 13,000 psi; uniform in strength in all flatwise directions due to the random distribution of fibers. Generally speaking, the product will withstand continuous temperatures of 250°F and intermittent temperatures of 300°F without serious loss of strength, and physical properties increase somewhat as temperatures go down to −90°F.

Low modulus of elasticity (1.75×10^6) compared with iron (29×10^6) and aluminum (10.5×10^6) means high impact strength and shock resistance. Dimensional stability is good, an out-of-round tolerance within 1/32-inch being maintained on a washer tub 24 inches in diameter, against about ¼-inch in metal.

Preforms Are Used—The accompanying illustration shows two parts in production. The smaller is a hot water tank for an automatic dishwasher, a cylindrical piece closed at one end, 6 inches inside diameter and 15 inches deep. Draft of 2-3 degrees in the sidewalls is necessary. Molding technique is conventional, preforms being produced first, placed in setting ovens and then transferred to the molding press which has steam heated male and female dies. A measured amount of resin is poured over the preform after it is positioned on the male die, and the dies are closed for 1½-3 minutes, depending upon temperature of the dies and the wall thickness of the part. Heat and pressure distribute the added resin uniformly through the piece. The molding is removed from the dies and has a smooth and lustrous surface, requiring no further finishing.

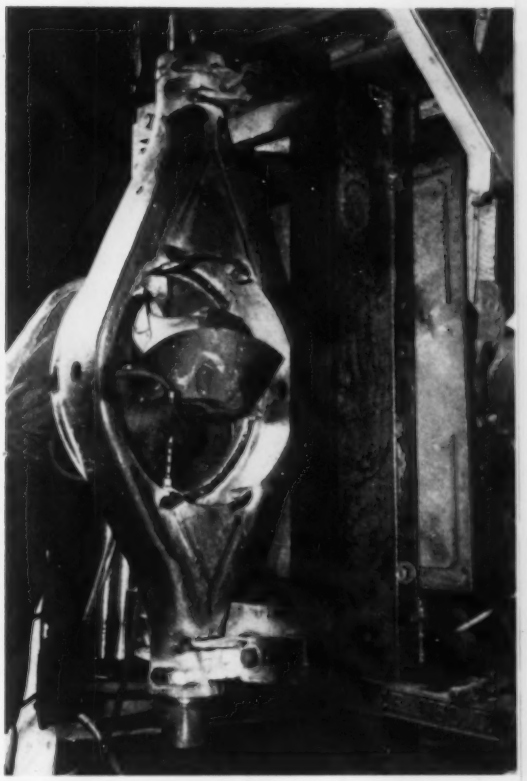
The press at the right in the illustration handles a larger molding, the outer shell for a washing machine basket, 24 inches in diameter and 9⅝ inches deep. Processing technique is similar to that for the hot water tank. Reinforcing ribs must be of such design that the part can be removed from the dies readily; thus no undercuts are possible.

The presses are operated in the nonferrous foundry department of the Apex plant and handle circular containers up to 30-inch (*Please turn to Page* 134).

Plastic moldings reinforced with fiberglass are produced on these presses, equipped with steam heated dies. At left is a hot water tank for a dishwasher machine, formerly of Monel metal; right is outer shell for a washing machine basket, formerly comprising 28 aluminum pieces. Preforms are shown in the left foreground, finished moldings stacked in the right foreground

Welded Differential Housing 20 Per Cent Lighter

By R. R. KILGORE
Welding Engineer
Lincoln Electric Co.
Cleveland

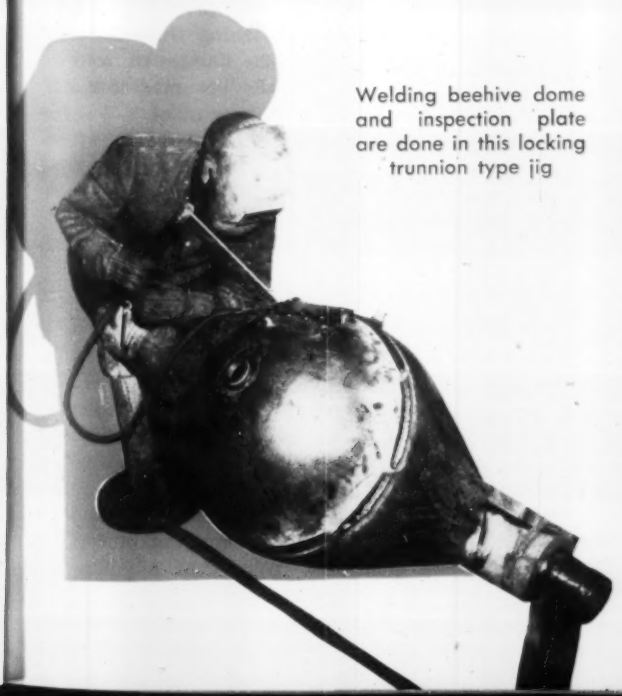


Inside welding bearing hub. Gussets and foot pads are also welded in this jig. All welds are positioned to save wear and tear on operators. Total time in jig is 2 hours

A 20 PER CENT weight reduction maintaining maximum rigidity is the result of redesigning for welded fabrication the rear axle differential housing of large self-propelled earth movers. In addition, by careful jigging there is a considerable saving in machining time.

The large units are manufactured by the Western Gear Works, Lynwood, Calif., for use on earth movers made by Wooldridge Mfg. Co. of Sunnyvale,, Calif. These are among the largest single reduction axles ever to be built. In use they are subjected to high stresses resulting from moving 45-ton loads over rough terrain at speeds ranging up to a maximum of 17 miles per hour.

Maximum Rigidity Needed—Prompting the redesign was the desire for a rigid, lighter housing and improved production. It was felt that with fabricated steel a shape could be obtained most suited for maximum rigidity with minimum weight as required by service conditions.



Welding beehive dome and inspection plate are done in this locking trunnion type jig

The banjo frame is press-formed in two halves from 5/16-inch plate. These are joined by butt welding inside and out. Trunnions are 4 inches OD by 1½-inch ID tubular members and the trunnion rings are cut from 1-inch plate.

Rings and trunnions are J-scarfed, ground out by hand and butt-welded together and to the frame with three passes of a ⅜-inch electrode. A 1-inch ring is also welded inside and out to the drive shaft side of the housing.

Welded in Positioner—For inside welding of the bearing hub, gussets and foot pads, the housing is placed in a positioner. The foot pads are bolted to the positioner and the banjo located in the pads. After the pads are welded, the entire unit is positioned to permit downhand welding. This positioning not only cuts welding time but reduces operator fatigue.

The final welding operation on the beehive dome and the inspectoin window is completed in a simple locking trunnion jig.

After welding, the assembly is stress-relieved for machining of shafts, flanges and foot pads. The final unit weighs 350 pounds as compared to the previous weight of 442 pounds.

Welding on the housing is done by Waldrip Engineering Co., Hollydale, Calif.

Correct Mounting Methods

Eliminate Grinding W

These suggestions of the Grinding Wheel Institute supply a long-standing need for conclusive information based on sound research on the amount of torque to use when mounting wheels on cylindrical grinding machines

MORE sleeve-mounted grinding wheels are broken by "springing" of the flange than from any other single cause. This "springing" is due to excessive tightening of the flange screws, which in turn is attributable to lack of knowledge of the proper amount of "wrench pull" to use when mounting a wheel.

No authoritative specific information has been available on this subject, so it has been necessary for each operator to place his own interpretation on such general instructions as "tighten the screws just enough to keep the wheel from slipping" or "do not tighten too much."

The Safety Committee of the Grinding Wheel Institute, Greendale, Mass., was assigned the task of preparing specific recommendations covering the amount of torque or "wrench pull" to use when mounting wheels on each of the more common makes of cylindrical grinding machines. These recommendations supply a long-felt need; if they are followed they should go a long way toward eliminating wheel breakages on cylindrical grinding machines due to improper mounting technique.

The mounting specifications apply to sleeve-mounted wheels 30 inches and smaller in diameter, up to 4 inches thick and with 10 and 12-inch diameter holes on plain cylindrical, crankshaft and cam grinding machines made by Brown & Sharpe Mfg. Co., Cincinnati Milling Machine Co., Landis Tool Co., and Norton Co. They may be used as a guide also for other makes and types of machines within the size range indicated, where the basic design of the wheel sleeve is similar.

Use new clean blotters each time a wheel is mounted and tighten the wheel flange screws up to 15 ft-lb. Tighten one screw lightly and then go to the diametrically opposite screw and tighten it a similar amount. Next tighten those screws midway between and continue this criss-cross pattern of tightening until all screws have been tightened slightly. (Do not at first tighten one screw up to the full 15 ft-lb and then go to the adjoining screw and tighten it up to 15 ft-lb. This procedure is likely to damage the wheel because the flange will not be drawn down evenly against the wheel.)

Next tighten each screw to 15 ft-lb, following the same sequence as before. It may be necessary to repeat this final tightening a second or third time to insure that all the screws are uniformly tightened to 15 ft-lb torque.

Retighten After Use—After a period of 8 to 16 hours grinding service screws should be checked for any looseness caused by compression of the blotters and retightened if necessary to restore the original tension. Follow the same criss-cross procedure. Wheel and wheel sleeves do not have to be removed from the machine for this supplementary tightening.

No research has been conducted on the types of mounts and sizes of wheels described below, but it is suggested that the following procedures should be helpful in determining proper flange pressures.

On jobs using wheels larger than 30 inches in diameter and thicker than 4 inches and where the rate of stock removal is high it may become necessary to tighten the flange screws to a torque reading higher than 15 ft-lb to prevent slippage of the wheel between the flanges. Any increase should be made in small increments until the minimum is found where slippage is overcome. At this point flanges should be checked to make sure they are not being sprung. If springing is taking place the only remedy is to procure more rigid flanges.

Wheels used for crush-dressing jobs also may require that the flange screws be tightened to more than 15 ft-lb to prevent slippage or shifting of the wheel due to the heavy radial pressure required while dressing. Here also it may be necessary to procure special heavy flanges if the required flange pressure cannot be obtained without springing.

Centerless grinding operations are often severe and similarly may require more tightening than the recommended 15 ft-lb. However, the flanges on centerless grinding machines are usually designed to resist tightening pressures up to 40 ft-lb or more.

The recommended tightening torque of 15 ft-lb should not in any way be interpreted as applying to any other type of mounting than that illustrated in the drawing. For instance, wheel mountings of any type that employ a single central nut to tighten the flanges usually require much higher torque readings to produce the same effective flange pressure against the wheel.

Recommendations Based on Tests—The preceding recommendations are all based on a series of tests conducted in the plants of Norton Co., Worcester, Mass.; Landis Tool Co., Waynesboro, Pa.; Cincinnati Milling Machine Co., Cincinnati; Brown & Sharpe Mfg. Co., Providence, R. I.

Objectives of the tests were to establish the following two values: (1) Minimum amount of torque for flange screws necessary to prevent slippage of

Wheel Breakage

the grinding wheel when grinding up to the full capacity of the machine. (2) Maximum amount of torque for flange screws without causing objectionable distortion of the flanges or otherwise damaging the wheel. Obviously, the recommended wrench torque should be somewhere between the two.

Tests Procedure—The outside loose flange was first checked for flatness using a surface plate and a dial indicator type height gage. The wheels (30 x 2½-inches to 3 x 12 inches) were mounted on the wheel sleeves in conventional manner using a torque wrench to tighten the flange screws instead of the customary shop wrenches.

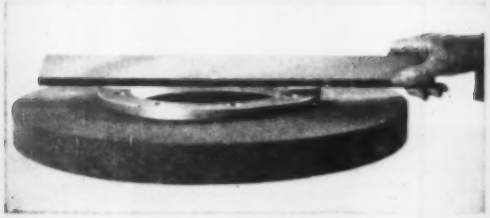
The wheel sleeve was placed on a bench with the flange in a horizontal position and facing up. The wheel and loose flange were then placed in proper position, using new clean paper blotters. To eliminate variations in tightening pressures due to differences in the fit and condition of the screw threads, the threads were cleaned when necessary so that the screws could all be seated by finger pressure. Screws were then tightened slightly, starting with one, then the one diametrically opposite.

Next, those midway between were drawn down slightly and so on until all had been tightened a similar amount, not the final prescribed amount but just *part way*. Order of tightening was continued in this criss-cross pattern until all the screws were uniformly tightened to the prescribed torque. After mounting the wheel, sleeve and flange assembly on the grinding machine spindle, a reference line was drawn with crayon at the periphery of the loose flange and onto the side of the wheel to indicate any slippage taking place between the two during the grinding test.

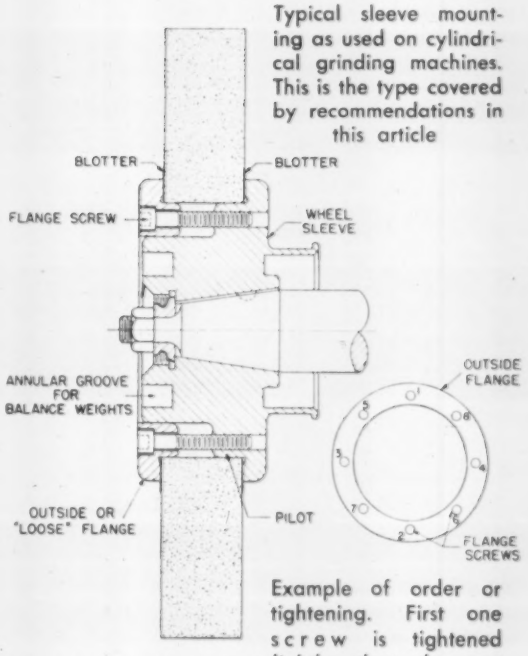
With the wheel guard in place the grinding test was made on cylindrical steel stock by the plunge cut method at a rate sufficient to tax the wheelhead motor up to and beyond its rated capacity. Grinding was performed using a full flow of coolant and the machine was stopped after every test grind to inspect the reference line on the wheel and flange to note if any slippage had occurred.

At the conclusion of the grinding test the torque on the screws was increased in several stages and the lateral distortion of the flange checked at each stage with a dial indicator. The loose flange was then removed and checked on a surface plate for indication of any permanent distortion or "springing."

No Slippage—In none of the tests did slippage occur with the flange screws tightened to a torque of 15 ft-lb, even when grinding at a rate beyond the normal capacity of the machine. This proved to be a revelation to many observers, which included a number of experienced machine operators. Quite ob-



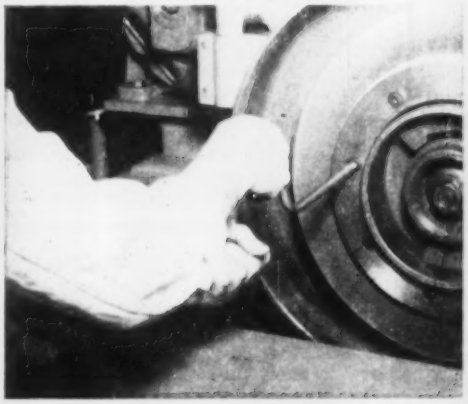
Straight-edge across back of flange shows the extent of "dishing." This flange was sprung about 0.040-inch



Typical sleeve mounting as used on cylindrical grinding machines. This is the type covered by recommendations in this article

Example of order or tightening. First one screw is tightened lightly, then the one diametrically opposite in the order shown here. Then each screw is tightened to 15 ft-lb, following the sequence as before

The actual installation of a wheel sleeve type mounting on a cyindrical grinding machine. Operator is tightening flange screws



viously, it has been customary among a large percentage of operators to tighten the flange screws more than is necessary.

The tests revealed some differences on the rigidity of the flanges due to differences in design. In other words, some would distort more than others with a given amount of tightening. However, in no case was there any distortion of consequence when the screws were tightened to a torque of 15 ft-lb.

Blotter Compression—Flange screws showed less tension after the wheels had been placed in service and considerable grinding done. This effect was noted during the grinding tests and also in the shop on production machines where the flange screws on some were found to be quite a bit looser than the operator normally tightened them when mounting the wheel.

This feature was given further study. After setting the flange screws on a test wheel to 15 ft-lb using a torque wrench, a reference line was scratched across the head of each screw and extending onto the flange. After the wheel had been in normal service for 8 hours the screws were inspected. Reference lines were all in alignment, indicating that none of the screws had turned. Each screw was then loosened the amount of torque required to realign the reference line noted with a torque wrench. For each screw this was considerably less than the original setting of 15 ft-lb.

Since the screws had not turned, the reduced flange pressure was probably due to the blotters becoming further compressed during the period when the wheel was in service, causing tension on the screws to decrease. Presumably the degree of compression and the time required to cause it will vary with the composition and thickness of the blotters and possibly with the nature and severity of the grinding operation.

The screws were retightened to 15 ft-lb with the torque wrench and new reference lines scratched across the head of the screw and onto the flange. After another 8-hour period of operation the screws were again checked. As before, none of the screws had turned. This time the tension on the screws had decreased only slightly, indicating that the additional increase in blotter compression was slight. After tightening the screws again to 15 ft-lb a third 8-hour grinding run was made. This time when the screws were checked it was discovered that they remained at the original setting of 15 ft-lb indicating that the blotters had not compressed further.

Torque Wrench Used—In the preceding test reports and in the recommendations, mention is made of torque in terms of "foot pounds." While it would be possible to control the amount of torque by measuring the pull on a plain wrench of measured length, a more satisfactory and convenient way of doing this is by the use of a torque wrench. This is merely a straight bar lever with an adaptor at right angles to one end to fit the head of the screw, bolt or nut fastener; it usually has in the handle end a calibrated dial gage, or scale and pointer, to indicate directly how much "wrench pull" is being exerted at the adaptor end.

A torque, or "wrench pull" of 1 ft-lb (12 in.-lb) on a screw is equivalent to a pull of 1 pound at right angles to the screw and at the end of a lever measuring 1 foot in length. Similarly, a torque of 15 ft-lb (180 in.-lb) is equivalent to a pull of 15 lb at the end of a lever measuring one foot in length.

Use of a torque wrench is a standard method of tightening bolts, screws and other fasteners to uniform stress loads. The ideal method of applying uniform stress load to a bolt or screw would be the measurement of the elongation of the shank after tightening, but since this is not possible or practical for ordinary cases, the torque wrench is considered the next best medium.

Several types are available but the principle for all is the same. It is important to follow the manufacturers' instructions as to the proper use of this tool and it is also important that they be checked for accuracy at regular intervals.

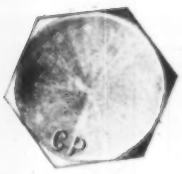
Net Torque Affected—When tightening a bolt or screw it is difficult to determine what part of the wrench pull is being used to apply tension in the bolt and how much is being dissipated in thread friction and other friction losses. However, condition and fit of the screw threads can affect the reading with a torque wrench as much as 25 per cent or more. In the aforementioned tests, condition and fit of threads was maintained in every case so that the screws could be seated by finger pressure, without any measurable torque. This helped to reduce the amount of loss due to thread friction and to insure uniform tightening of the screws.

If a measurable amount of torque is required to seat the screws, due to the fit of the screw threads, a convenient method of compensating for this is to measure the torque required to turn the screws and add this amount to the required torque. For instance, if the required torque for each screw is 15 ft-lb and if 5 ft-lb is required to turn the screw until it is seated, gross reading on the torque meter should be 20 ft-lb when final tightening takes place. This results, of course, in a net effective torque of 15 ft-lb. This procedure requires more care and the chance of error is greater than if the screws and screw holes are maintained so that the screws turn easily in the threaded holes.

Silver Clad Sheets Made

A laminated strip consisting of a solid sheet of silver (not an electroplating) clad on either one or both sides of a mild steel core is a development of Rolled Plate Division, American Silver Co. Inc., Flushing, N. Y. It is available in widths up to 4 inches, thicknesses down to 0.005-inch and in any required temper. Various silver to steel ratios are being manufactured and strip is rolled to commercial or precision tolerances. A high as-rolled luster is produced that requires practically no polishing and can be electroplated directly with gold or other nonrestricted metals.

Silver-clad steel may be used as a substitute for brass, nickel silver and other metals subject to NPA order M-47. It can be shaped by stamping, bending, drawing, spinning and other conventional metalworking processes and component parts can be assembled by means of silver brazing or soft soldering.



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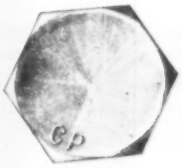

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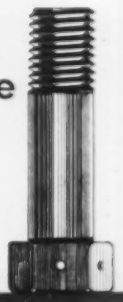

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Zebra Type Open-Hearth Roof Steps Up Heats Per Campaign

INCREASED open-hearth steel production has been made possible by the development of the zebra-type furnace roof which incorporates silica and basic brick in alternate courses. The silica brick, which have high strength, insure a mechanical stable roof; the basic brick, which have superior resistance to chemical attack, wear away more slowly and protect the silica brick, whether they be regular or superduty grade. The result is a roof which is intermediate in cost and durability between one comprising 100 per cent silica and one made entirely of basic brick.

An industry-wide survey made by the General Refractories Co., Philadelphia, shows that since mid-July, 1950, the zebra roof has gained popularity faster than any other construction in open-hearth history. At least 39 (48 per cent) of the country's 81 ingot producing companies are using zebra roofs in 60 (45 per cent) of the country's 134 plants, and 310 furnaces (32.7 per cent) of the 947 total.

In 17 plants of 11 companies, zebra roofs are standard in every one of their 184 furnaces. One of these companies uses this type roof in 48 of the 65 furnaces in seven plants; 33 of these furnaces are in four plants in which this roof is standard. This roof also is standard in 99 furnaces of six plants of another company—one shop using it in all 27 furnaces, another in all 16, a third in all 15 and a fourth in 13 furnaces—with 18 more to convert as they are rebuilt. This will give a total of 89 furnaces in four plants. Nine of the 17 plants using this type roof construction as standard will employ it in 131 furnaces. A third company uses this roof in 12 furnaces in four plants, a fourth in 23 furnaces in three plants, a fifth in three plants, and four companies use it in two plants each.

Twenty-three out of 28 plants alternate one ring of basic brick and one ring of silica brick; one plant uses two basic rings to one silica ring on two furnaces; four plants use one basic ring to two silica rings; and one plant uses one ring of each at one end of the furnace, and two rings of each at the other end of the same furnace.

Of 56 plants, 31 use keys, 25 use wedges, and one will compare wedges and keys. Twenty-four of 27 plants use zebra design from knuckle to knuckle, and a few plants also extend it part way up the port slopes. In 23 out of 24 plants, the basic and silica are flush at the fireface when installed. In one plant, the basic brick are installed in such a way that they extend 1½ inches beyond the silica at the fireface thus protecting the silica even on the first heat.

Most plants use this design along the backwall only, with the rings of basic brick extending out 1 to 6½ feet from the skew, the average for 25 plants being 4 feet. Six of these 25 plants also use the basic brick an average of 4 feet out from the front

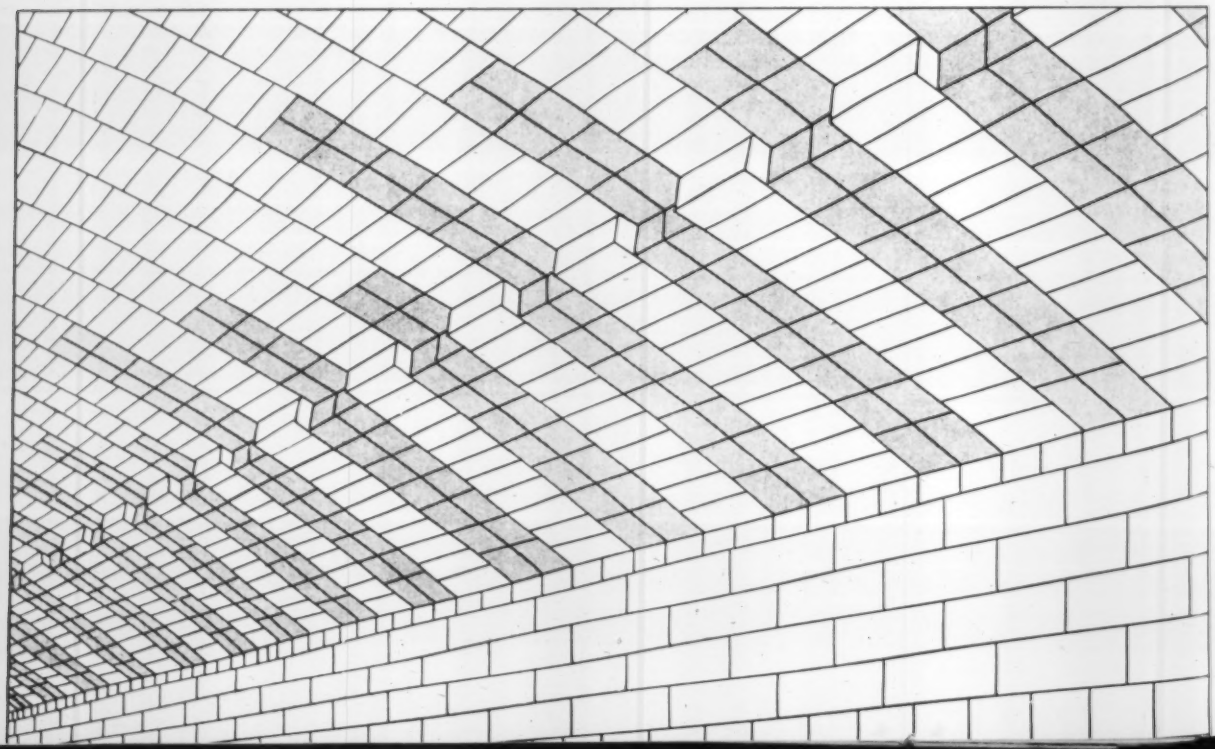
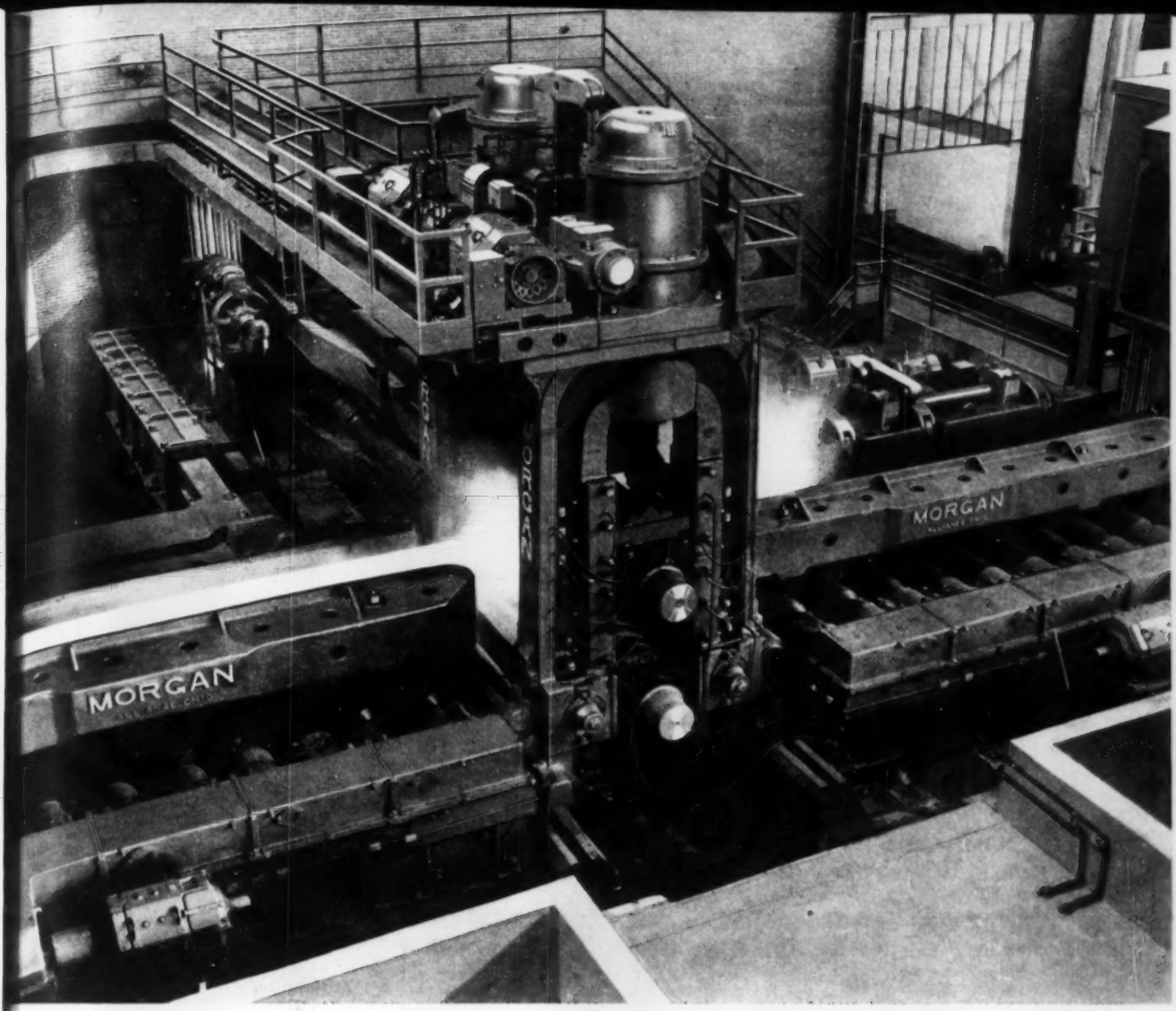


Fig. 1—Drawing showing how special basic roof brick with integral steel plates are alternated with silica brick in a typical open-hearth zebra roof. Inexperience has shown that alternate rings of basic and silica brick, which are most widely used, generally give best results



Morgan 40″ — 2 High Reversing Blooming Mill direct connected to two 3000 Hp. 40/100 Rpm. motors. Top roll and both spindles are hydraulically balanced by individual cylinders connected to an air hydraulic system. Speeds of motor driven screw down, feed rollers, mill tables and manipulator are regulated by variable voltage control.

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Fig. 2—Number of companies using zebra roofs with special basic roof brick having integral steel plates

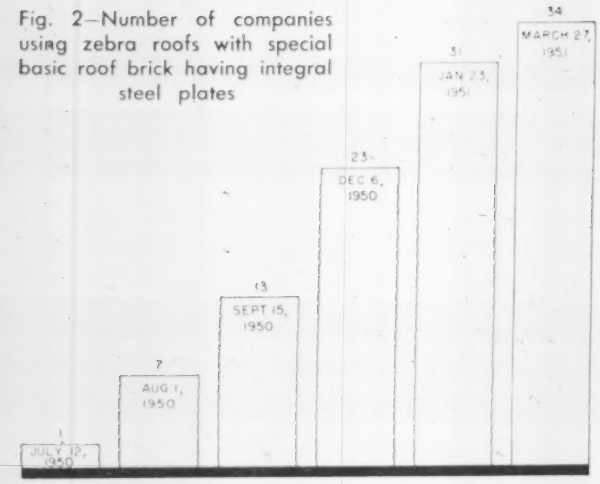
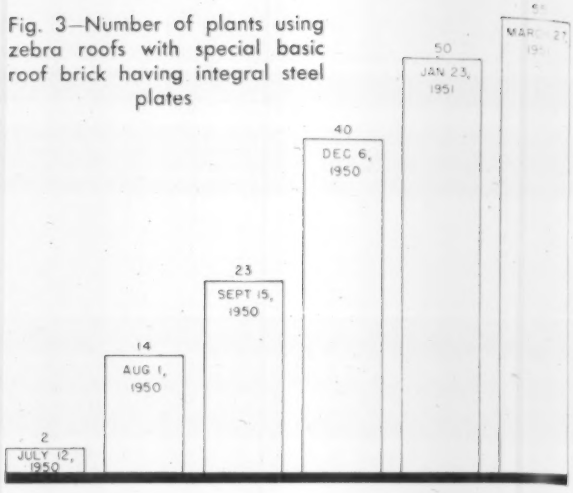


Fig. 3—Number of plants using zebra roofs with special basic roof brick having integral steel plates



skew. A few plants use the zebra construction along the front skew only. One plant obtained the same number of heats regardless of whether the basic brick extended the same distance from the skew, or were staggered as usual.

All ribs are silica brick in most plants, but a few roofs have been installed with basic ribs. None of these roofs has completed its run but, at best, basic ribs are a waste of money. They give less factor of safety when the roof gets thin, because they have lower hot strength than silica brick. It is recommended that ring construction be used in the zebra portion of bonded roofs instead of the checker board, herringbone or other patterns that have been tried. In most plants, expansion provisions are the same as for silica brick.

In eight of the 17 plants which use this construction in *all* furnaces, the increase in heats per campaign varies from 0 to 41.2 per cent and averages 19.4 per cent. In several plants, this increase in campaign length is obtained despite no patching or smaller patches. In one plant, the number of patches for six months dropped from 35 to two. Some plants get the *same* number of heats per campaign as with silica brick, but eliminate patching—often a knuckle to knuckle patch 3 to 4 feet or more from the skew. One plant finds hot work reduces 30 per cent; another finds repairs to backwall and bottom are reduced.

Seven of 20 shops report that zebra roof reduces cost per ton of steel; six find that it does not reduce the cost, but increases production; and seven don't know the effect on cost, but use this zebra roof construction solely because of the increased production.

Of 17 plants reporting, 14 find that, at the end of the campaign, the basic brick extend 1 to 3 inches beyond the silica (Fig. 4), or an average of 1¾ inches, and three plants report basic and silica the same length. It is probable that in each roof the basic brick varies from the same length as the silica just after spalls have come off, to some 3 inches longer, just before spalling occurs.

In addition to 17 plants known to be using this design as standard, at least eight more will extend it to more furnaces, two will continue using it the same as now, and one will return to silica. In many plants, test data are, as yet, insufficient to justify definite conclusions. In a few plants, this construction offers no advantage, because silica roofs, without patching, last until the checkers are clogged. Several plants which have changed from magnesite-chrome to special chrome-magnesite roof brick have obtained better results due to reduced spalling.

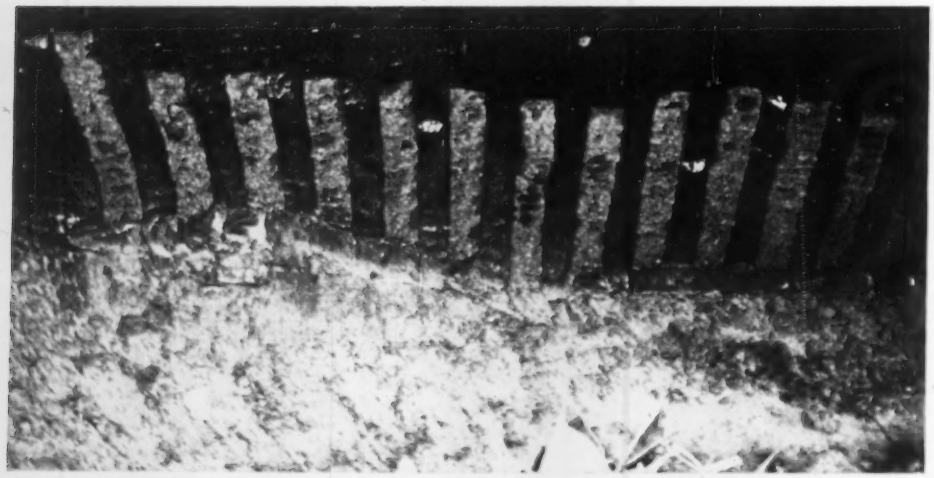
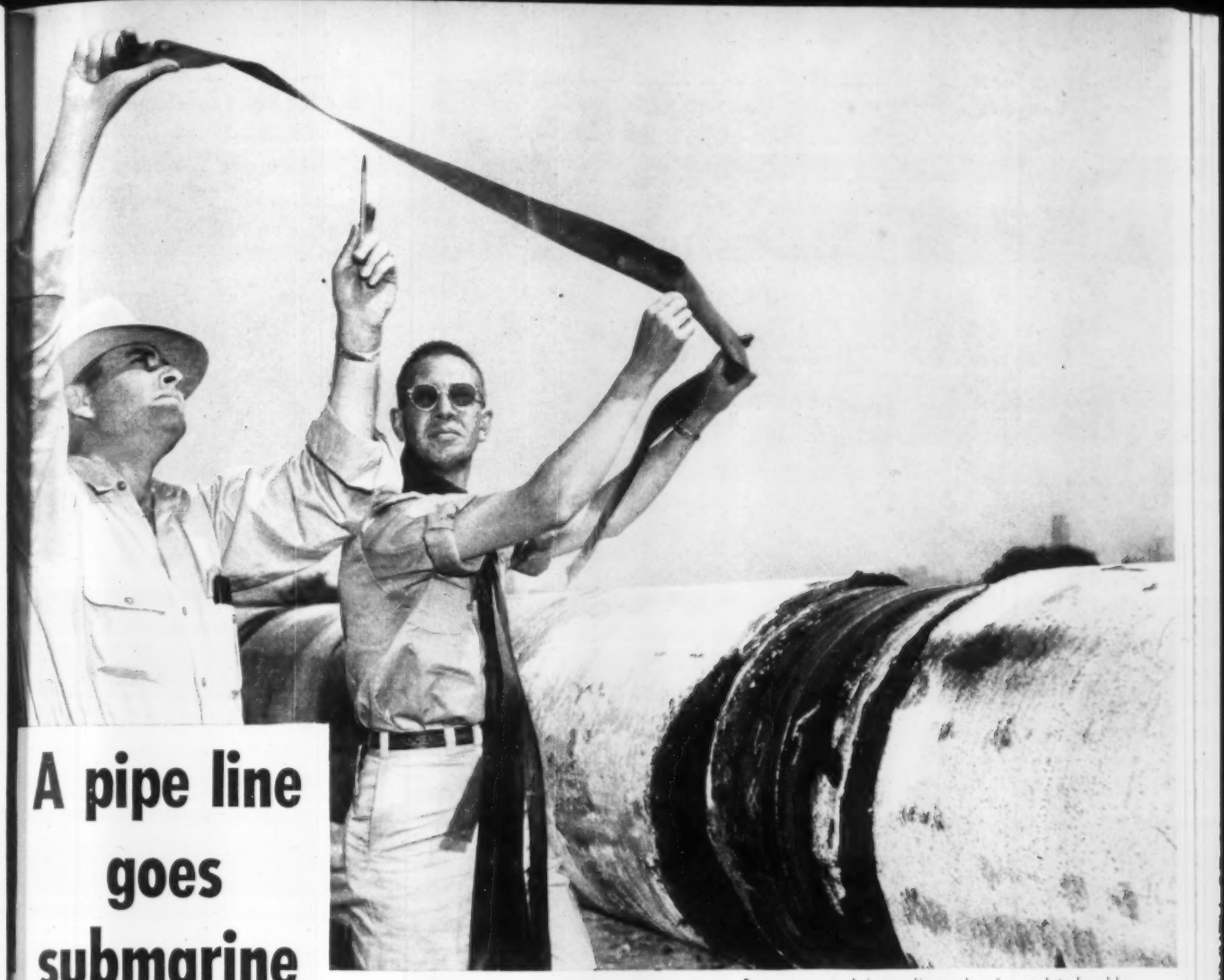


Fig. 4 — Special basic roof brick and super-duty silica brick in a zebra open-hearth roof at the end of a successful campaign. As a result of such experience this plant has standardized on this type roof construction



Inspectors studying radiographs of completed welds in the 26-inch-diameter, 1⅛-inch-thick steel pipe.

A pipe line goes submarine and Radiography proves each weld

NATURAL GAS from Texas makes its final plunge into New York City through a 4800-foot pipe line laid under the bed of the Hudson River. Each joint was welded. And with 450 lbs. p.s.i. inside and the pressure of silt and 90 feet of water outside, these welds had to be sound and set for a long life. To make sure, the contractor had radiographs made of every joint.

This is how Radiography helps do important jobs well. It puts a valuable O. K. on welds. It helps build reputations for consistently good work.

Wouldn't you like to know how it is helping to increase business and improve production for others? Your x-ray dealer will be glad to tell you. Get in touch with him.

EASTMAN KODAK COMPANY
X-ray Division **Rochester 4, N. Y.**

Radiography...

another important function of photography

Kodak
TRADE-MARK

FOR THE BIRDS

BIRD: Stop shaking the pole! You'll scramble my eggs!

MAINTENANCE MAN: But, Mrs. Bird, it's my job to service this light!

Well, be smart and get a THOMPSON HANGER! Then you could lower the light to the ground for servicing. You'd be safer, the company would save a lot of money, and I'd have some peace.

Lower the light? Didn't know it was possible! How would I get it up again? And what about the wiring and electrical hazards?

The THOMPSON HANGER is simplicity itself. All up-and-down movement is controlled by a chain or cable that's part of the installation, and the live electrical contacts stay at the top. What's more, the hanger automatically repositions itself. It's completely safe and absolutely foolproof.

Sounds swell! The boss will buy that! Where can we get all the details?

From the Thompson Electric Co., of course. Write for their new Catalog No. 50. Now, scram and leave me alone. This altitude is for the birds!

Mrs. Bird, in her migratory wanderings, has learned that three important facts are synonymous with THOMPSON HANGER installations: (1) maintenance costs are down to absolute minimum, (2) lighting service men have top safety records and (3) all lights are clean, operating at maximum efficiency to assure better over-all plant operations.

Why don't you, too, write today for the Thompson Electric catalog? There's no obligation.

CATALOG NO. 50 describes THOMPSON HANGERS and accessory items in detail.

171-TE

THE THOMPSON ELECTRIC CO.

1161 Power Avenue • Cleveland 14, Ohio

Use the Right Lubricant

(*Continued from Page* 119)

Cold Forging Lubricants — Cold-forging, cold-heading, nosing, and upsetting operations at ambient temperatures usually require a lubricant of some type between the die and work.

Ferrous work is best done with water or oil-based fluids containing a solid inorganic filler such as mica, clay, talc, or in some cases, graphite. Nonferrous cold forging can sometimes be handled with mineral oils containing such polar compounds as fatty oils and fatty acids.

The water-based lubricants are usually paste type compounds incorporating soaps, fatty oils, fatty acids, some water, mineral oils and solid fillers. Diluted with two to three parts of water, they are swab applied on the dies as required. Oil-based lubricants containing pigments or other solids are swab applied in the same manner.

Mineral or mineral-fatty oils used in cold-heading and upsetting work may be spray or swab applied.

Hot Extrusion Lubricants—In the hot extrusion of steel several classes of substances are utilized to cool the dies and prevent metal-to-metal contact at extrusion pressures. One general class of such lubricants consists of combinations of mineral oil, inert pigment compounds and graphite. The viscosity of oil vehicle used depends on whether application is by swab or spray. Heavy black oil or cylinder oil bends usually are swabbed on the dies. Light oil blends are spray applied. If flake or amorphous graphite or plumbago are used for solid lubrication, the concentration employed is from 10 to 20 per cent. Colloidal graphite dispersions usually contain much lower solids concentrations and are hence easier to handle by spray methods. Soaps or other dispersants are sometimes used to hold the graphite in better suspension.

Amorphous, supercooled liquids are also used. Various vitreous substances have shown good promise in this connection, since the requirement for the purpose is that the lubricant shall melt at the work temperature and remain as a viscous liquid between the work and die. Though a relatively poor heat conductor, it serves to protect the die and prolong its service life. Borax has also been used for this purpose.

In the hot billet extrusion of nonferrous metals such as aluminum, brass, zinc, etc., graphited oils are also used, but only to lubricate the piercing mandrel. In ordinary tube

extrusion of such metals, the plug is somewhat smaller in diameter than the interior bore of the extrusion chamber. In the course of extrusion, a thin shell of the billet is left behind in the chamber. The purpose of this is to avoid using the outer oxidized surface metal of the billet and so to avoid inclusions (called extrusion defect) in the finished extruded tube. Obviously, no lubricant then is required on the exterior surface of the billet, or on the interior surface of the extrusion chamber. Application of the mandrel lubricant may be by either swab or spray method.

Cold Extrusion Lubricants — Cold extrusion, a method long used for production of nonferrous tubes and containers to package creams, dentrifices, greases, etc., has in recent years been developed to permit cold extrusion of steel. Lubrication consists essentially of two steps. First, a phosphate coating is applied to the slug or billet. This consists of spray or dip application in a hot (180 to 200°F) acid phosphatizing solution after the pieces have been degreased, pickled, and rinsed. The solid phosphate coating prevents metal-to-metal contact during extrusion and also serves as a base for the subsequently applied lubricant.

Second, an aqueous, fatty acid type soap emulsion is used for the actual extrusion lubricant. Various substances have been tried in the course of development of the process, including sulphonated tallow, lard, chlorinated waxes, sodium stearate, and fatty acid soaps. Application is by immersion in a dilute, hot (150°F) solution and drying to secure a thin, uniform, adherent coating absorbed on the phosphate undercoat.

Aluminum, copper, brass, zinc, tin, and lead are impact extruded by similar means.

As a lubricant on aluminum, such substances as tallow, lanolin, and combinations of waxes, fatty acids and soaps have been used successfully. Copper and brass are extruded with dried-on soap coatings, soap-fat compounds, beeswax, other wax combinations, tallow and similar polar type lubricants. Tin and lead are successfully extruded with hydrogenated cottonseed oil, zinc stearate, waxes, and wax-fatty acid combinations.

Application of lubricants to the metal slugs is made by either tumbling the slugs and lubricant in a drum, or by dip application in the heated, fluid lubricant and then air drying. The important aspect in the application of these lubricants is to secure a thin, uniform coating over the entire surface of the slug.

The A B C of M S T

A Quality Product

A ALWAYS MAKES POSSIBLE
B ETTER PRODUCTS AT LOWER
C OST

Michigan
Electric Resistance
WELDED
STEEL
TUBING

ROUND
3/8" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
1/2" to 2" 20 gauge, 1" to 2 3/4", 14, 16, 18 gauge
Carbon 1010 to 1025

Michigan Tubing
has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

Serving our COUNTRY
Serving our CUSTOMERS

We at Michigan are proud of our production record during World War II, when we manufactured many thousands of tubular products for the armed forces. We supplied electric resistance welded steel tubing both in straight lengths and fabricated into numerous intricate parts for many different uses, in vehicles, airplanes, bombs, etc.

Once again Michigan is prepared to serve the defense needs of our country with tubing for any application, in addition to meeting the requirements of customers for consumer products.

Whether for defense purposes or for products to maintain and improve our American living standards, Michigan engineers will be pleased to consult with you on tubing for better products at lower production costs.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.

More Than 30 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

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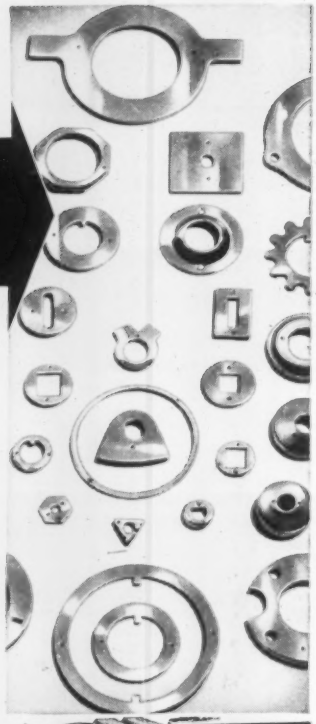
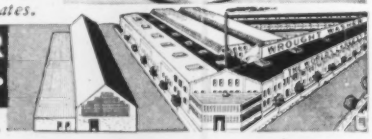
Since 1887

MILWAUKEE
WROT WASHERS



Better
WASHERS
. . . Competitively Priced

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*



WROUGHT WASHER
MANUFACTURING CO.
The World's Largest Producer of Washers
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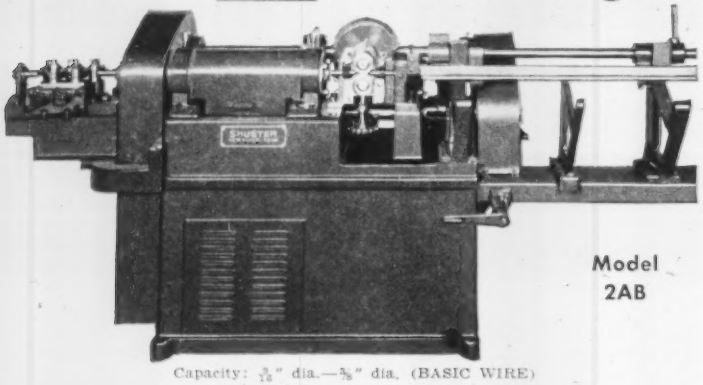
This New, Economical

SHUSTER

Cut Costs AND Accurate Lengths!



Model
2AB

Capacity: $\frac{3}{16}$" dia.—$\frac{3}{8}$" dia. (BASIC WIRE)

Automatic
WIRE STRAIGHTENING AND CUTTING MACHINE

This new "SHUSTER"—with its five gear-design straightening rolls—handles even badly twisted wire with ease. Square and rectangular as well as round wire may be straightened and cut to exact lengths. Other "Shuster" features that assure high speed, quality production are: almost continuous wire travel, rapid cut-off, V-belt motor drive, ball and roller bearings, and extreme rigidity throughout. Write for details.

Mfd. by METTLER MACHINE TOOL, INC.
132R Lawrence St. New Haven, Conn.
Representatives in all principal cities and foreign countries.

Conserve Metals

(*Concluded from Page* 120)

diameter and 25 inches deep, square containers 25 x 25 x 25 inches.

One Shortage Makes Another—With respect to the use of fiberglass moldings as replacements for metal parts, several points should be kept in mind. In the first place, projected defense demands for the material have pre-empted much of the supply and capacity now is being expanded several fold. A plentiful supply to cover more civilian uses is not seen before September. One interesting military use for the material is armor plate for aircraft. Random orientation and high unit strength of the glass fibers seem to have the capacity for slowing penetration of projectiles and at the same time not fracturing or fragmenting.

Phenolic or styrene polyester laminates both are in limited supply, because manufacturers of the resins must allocate their production since raw materials are short. Further, both resins are made all or in part from benzol, and an expansion of resin production might force a decrease in the amount of benzol allocated to synthetic rubber plants, where output also is being accelerated.

Behavior of Metals Studied

An increasing awareness on the part of metallurgists and designers that the atmosphere in which a high temperature component will operate must be carefully considered before a suitable material can be selected resulted in the symposium sponsored by the Gas Turbine Panel of the ASTM-ASME joint committee on the effect of Temperature on the Properties of Metals.

Behavior of metals in atmospheres from all the common fuels for mobile and stationary power generation were discussed. The paper on corrosion by oil ash has attracted special interest due to the current seriousness of the problem in many industries.

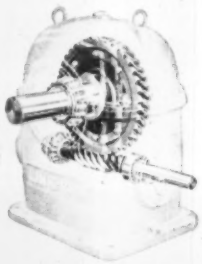
Engineering materials studied in the various papers also cover a wide range and include mild steel at one extreme and ceramics at the other with the multitudinous superalloys in between. Virtually all the materials currently in use in the power and fuels industry are included in one or more of the papers. Recent developments make the references on protective coatings and treatments of particular value. Copies of the symposium can be procured from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for $2.25.

No one speed reducer solves every reduction problem

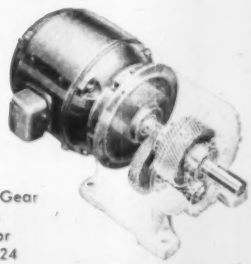
That's why LINK-BELT builds all 3

WHETHER it's a helical, a herringbone or worm gear drive that best fits your needs—you get an unbiased recommendation, an incomparable product from your Link-Belt power transmission engineer.

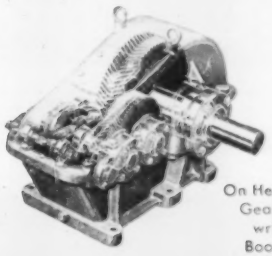
That's why Link-Belt builds all three; has no axe to grind. You can be sure you get the one that suits all your requirements for ratio, space, shaft position, shock loading and many other factors. Precision-engineered for quiet, economical power transmission, all Link-Belt drives will give you long service under the toughest operating conditions.



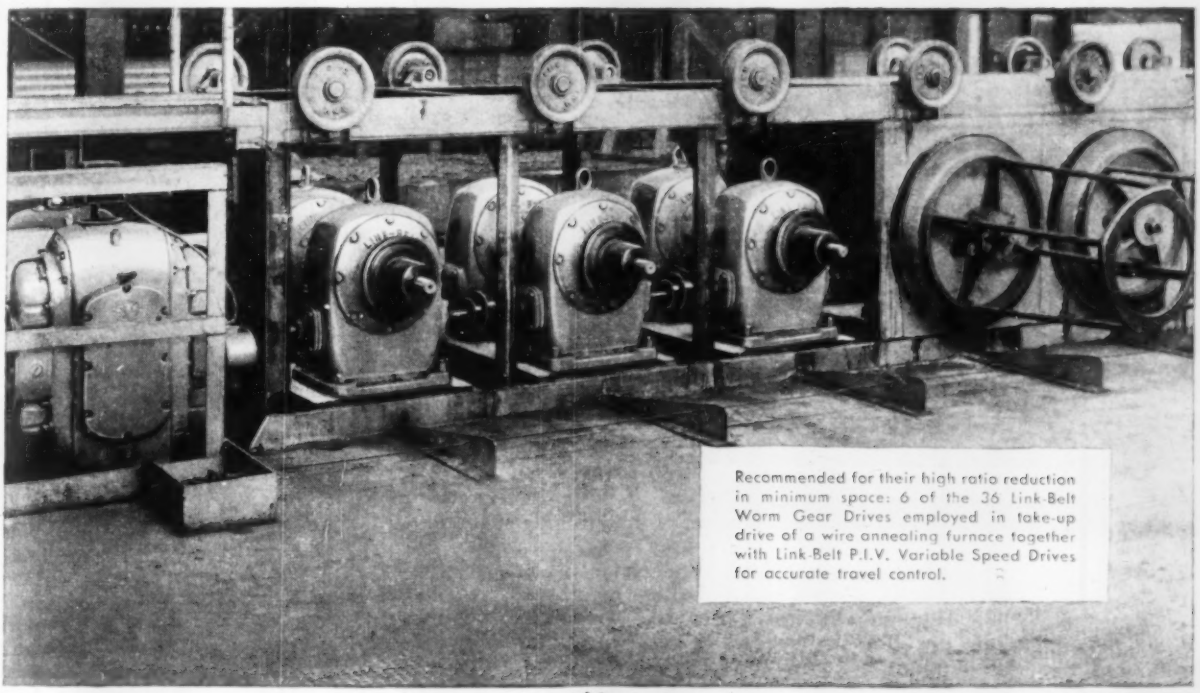
On Worm Gear Drives write for Book 2324



On Helical Gear Drives write for Book 2247



On Herringbone Gear Drives write for Book 2419



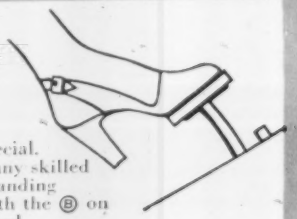
Recommended for their high ratio reduction in minimum space: 6 of the 36 Link-Belt Worm Gear Drives employed in take-up drive of a wire annealing furnace together with Link-Belt P.I.V. Variable Speed Drives for accurate travel control.

LINK-BELT
ENCLOSED GEAR DRIVES

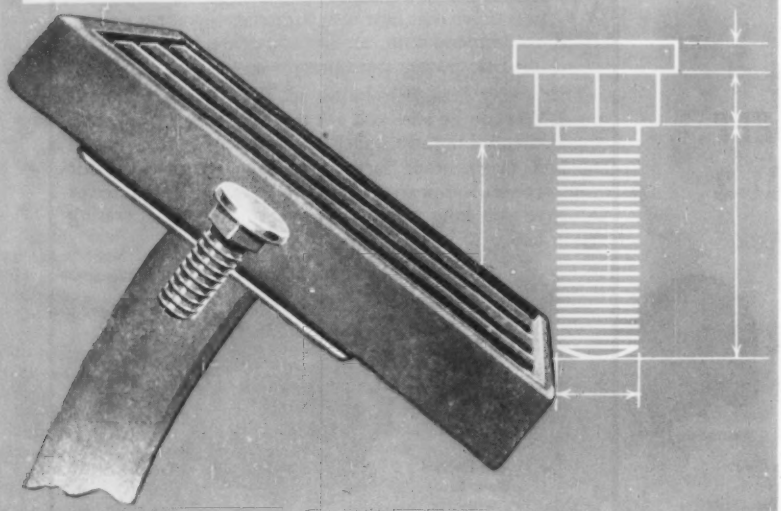
12,238

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

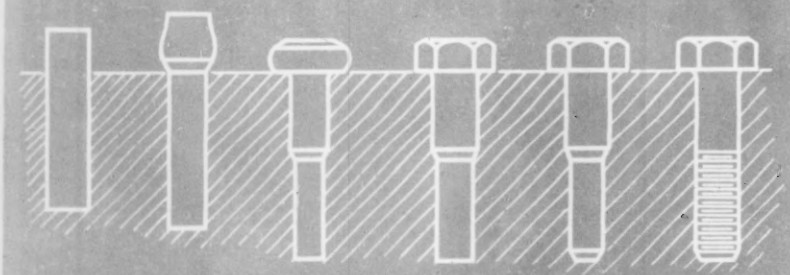
STANDING BEHIND EVERY STOP...



You will probably never see this small Ⓑ Special. Yet many discerning eyes have seen...and many skilled hands have helped to create the reputation standing behind this Ⓑ Fastener. Quality Fasteners with the Ⓑ on the head are recognized wherever bolts are used.



A SPECIAL Ⓑ FASTENER made with DIMENSION CONTROL and UNIFORM HIGH STRENGTH



Steps in the "Double Extrusion" Process

The production of this Brake Pedal Bolt represents the latest in cold-heading techniques. The strength of the bolt is actually increased during the fabricating processes. Even the threading is done without breaking the "skin" of the metal. Best of all, the economy that is effected by modern methods makes possible a wider use of bolts "designed to fit the job".

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation

NORTH TONAWANDA, NEW YORK

Sales Offices in Principal Cities. Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

Our Specialty is **"SOMETHING SPECIAL"**

dure as a practical tool for the furnace operator.

This new control procedure has been incorporated into the routine operation of Republic's No. 5 blast furnace at Cleveland.

Planned Lighting Pays Off

Planned Lighting for Industry is the name of a 47-page publication issued by General Electric's Lamp Department. Bulletin LD-4 is seen as specially timely because it meets the needs of an industry which is in the process of gearing for defense production. It outlines the benefits of good industrial lighting in the form of increased efficiency, safety and morale, improved quality, reduced spoilage, lowered costs, less eye strain, improved health and conserved manpower.

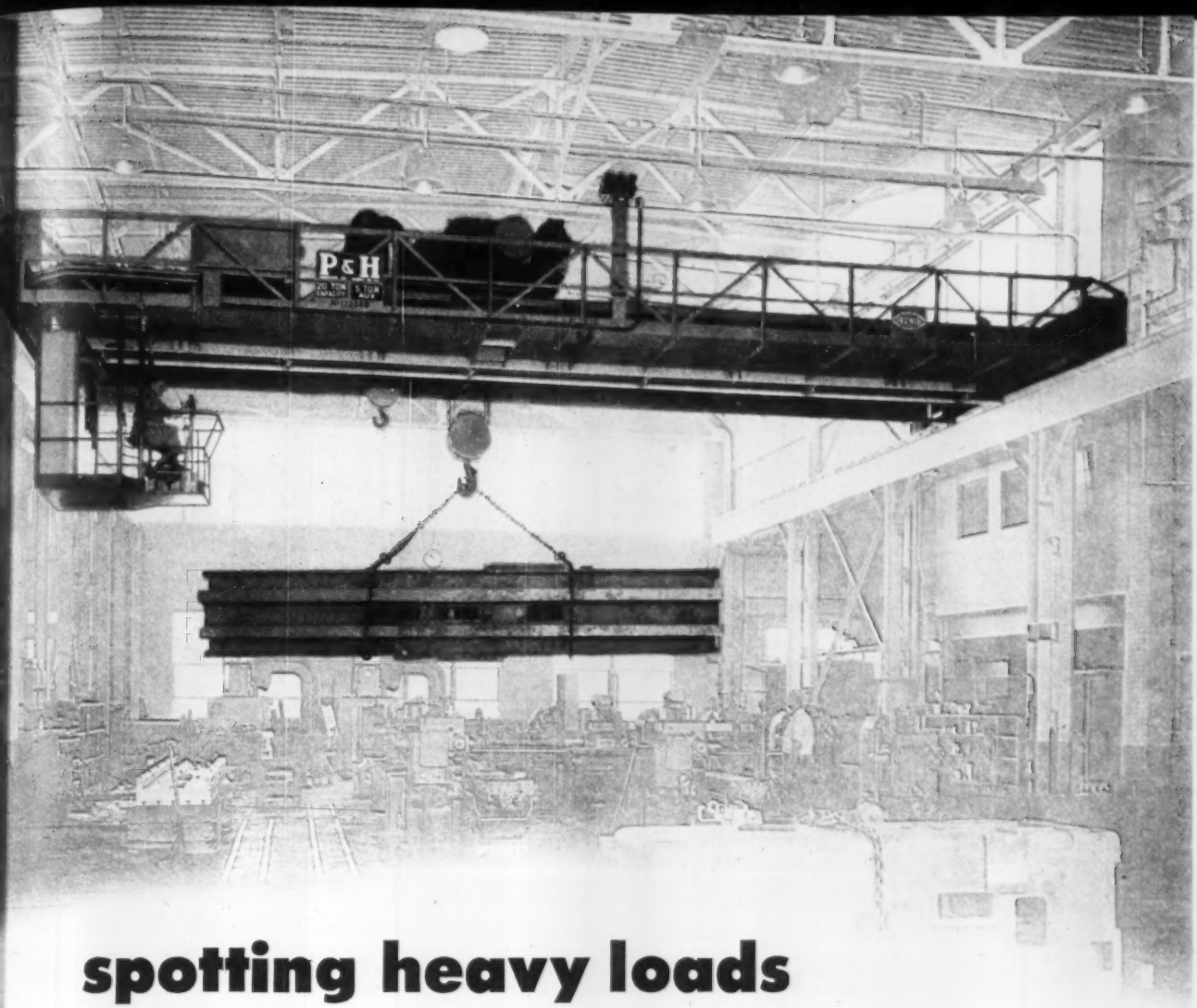
The bulletin then describes how to engineer lighting to various industrial tasks, discussing six principal lighting systems, and the use of specific techniques for special needs. It discusses types of light sources and luminaires available for the various lighting requirements and goes into the relationships of brightness and color conditioning. Sections of the publication are devoted to protective lighting, wiring for the lighting system, maintaining the lighting system, and the lighting of service areas, offices and drafting rooms. Copies of the bulletin are available from GE's Lamp Department, Nela Park, Cleveland 12.

Three Colors Sprayed at Once

An air-operated machine for rapid automatic spray painting of as many as three colors simultaneously on a variety of small parts is a development of Conforming Matrix Corp., Toledo, O. Parts are fed into mask holding fixtures which are an integral part of the rotary table. Machine is capable of a capacity of 18,000 completed pieces, painted three colors each eight hour shift.

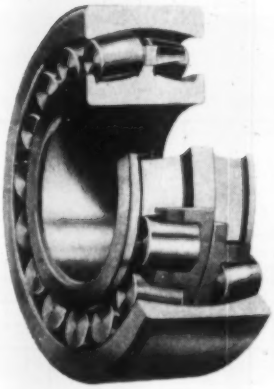
Entirely powered by 90 pounds constant air pressure the 800-pound rotary table can index 22 times per minute and attain a perimeter speed of 50 miles per hour during the 3-foot indexing travel. Painting occurs while the table is at rest. After the painting of each color the operators move the parts from one color mask to the next. No spraying can occur while the table is in motion.

Fourteen automatic DeVilbiss spray guns are so mounted underneath the table as to be easily accessible for inspection and adjustment. Properly placed baffles and an efficient exhaust system precluded the intermingling of colors on the parts as



spotting heavy loads

with Torrington Spherical Roller Bearings



Harnischfeger Corporation uses Torrington Spherical Roller Bearings for the trolley drive of P & H overhead cranes to assure smooth and dependable operation.

Spherical Roller Bearings automatically compensate for shaft deflection and frame distortion so that binding stresses are avoided. These precision bearings require a minimum of maintenance attention.

For continuous on-the-job reliability of your heavy-duty equipment, ask our engineers to help you incorporate the advantages of Torrington Spherical Roller Bearings.

THE TORRINGTON COMPANY

South Bend 21, Ind. • Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE • NEEDLE ROLLERS

SHENANGO *Centrifugal* CASTINGS ... KEY TO SAVINGS

Typical of innumerable special shapes cast centrifugally *by Shenango, these splined "star" rolls of Meehanite Metal are used to convey coated cloth and synthetic material through a hot fast-drying process.*

Why these rolls will do a **better** job, **longer!**

WHEN symmetrical shapes, such as these "star" rolls, are cast *centrifugally* by Shenango, they gain qualities that can't be matched in ordinary castings.

For example, metal for metal there's pressure-dense grain for finer, smoother finish; higher tensile to better resist stress and impact; freedom from sand inclusions, blow holes and other hidden defects to reduce rejects and avoid costly, unexpected failure.

So, when it comes to symmetrical shapes, large or small, ferrous or non-ferrous, you'll always be time and money ahead when you specify Shenango *centrifugal* castings . . . either rough or precision finished in the modern Shenango shops.

HELPFUL BULLETINS

Bulletin No. 150 covers Shenango non-ferrous centrifugally cast parts; Bulletin No. 151 for parts of Meehanite Metal, Ni-Resist and other special iron alloys. Either or both are yours for the asking.

SHENANGO-PENN MOLD COMPANY
491 West Third Street • Dover, Ohio
Executive Offices: Pittsburgh, Pa.

SHENANGO

ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES
MONEL METAL • NI-RESIST • MEEHANITE® METAL

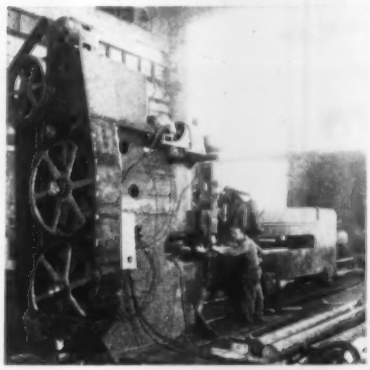
the three colors are sprayed. To maintain proper viscosity, paint is continuously circulated from the containers through the guns even when painting operations are momentarily suspended. There are only three controls for regulating atomized air for guns, speed of cycling and amount of paint applied.

Air pistons automatically assure snug fit of pieces in the masks. Table cannot index until the piston releases. An air-powered and hydraulically checked driving arm moves the rotating table. The driving pin moves the table to its successive index positions as it engages on its forward thrust. A locking device aligns the table in proper gun position as the pin is retracted.

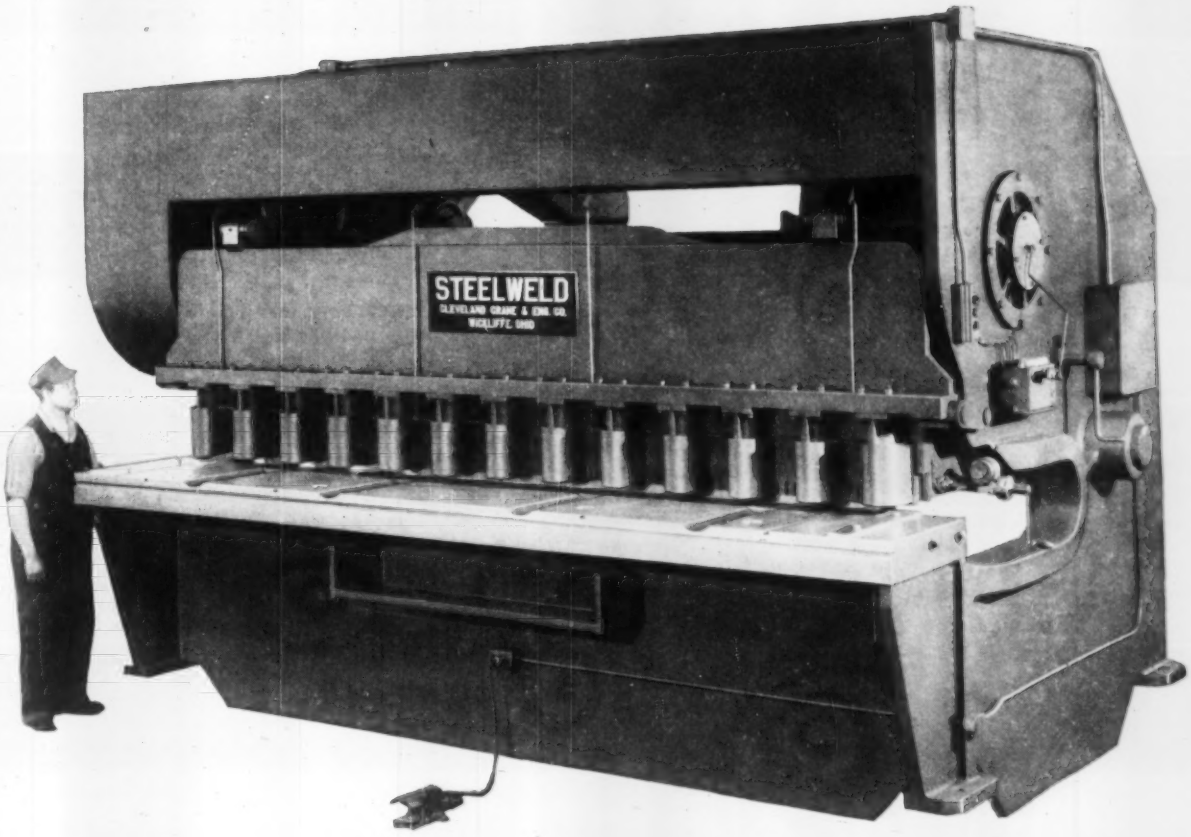
Air Cleaner Is Packaged

An encased precipitron electronic air cleaner that resembles a factory-fabricated section of air duct or plenum chamber 8-feet long with a built-in precipitron is being marketed by Sturtevant Division, Westinghouse Electric Corp., Boston. The package means a minimum of installation time and expense with maximum cleaning efficiency. Air cleaning capacities range from 8330 cfm at 90 per cent efficiency to 44,000 cfm at 85 per cent efficiency. Bureau of Standards' blackness test method is used to measure efficiency. Efficiency is 90 per cent when air velocity is 333 fpm and when velocity is increased to 400 fpm (up 20 per cent).

Rotary Shear Aids French Arms



FRANCE'S largest munitions manufacturer, Usines Schneider Creusot in Chalon-sur-Saone, will use No. 100 rotary shear built by Kling Bros. Engineering Works, Chicago. Machine is capable of shearing plate up to 1-inch thick and the clamping attachment permits the cutting and flanging of circles up to 17-feet in diameter. Total weight of the machine is approximately 55,000 pounds



CUTS 12 FEET 3/4 INCH STEEL PLATE

at 30 Strokes Per Minute

SOME FEATURES OF THIS SHEAR

1. Cuts by pivoted-blade principle.
2. Operated by electric foot switch.
3. Knife clearance adjusted by hand crank and dial indicator.
4. 36-inch throat permits slitting wide plate.
5. Lift-up type back gauge on ball bearings.
6. Heavy all-welded one-piece steel frame.

This is one of a complete line of Steelweld Pivoted-Blade Shears that has been developed for cutting plate of all thicknesses from 12 gauge to $1\frac{1}{4}$-inch plate and for lengths from 6 feet to 18 feet.

Steelweld Shears are radically different from all other shears now on the market. They have features never before possible. The revolutionary pivoted-blade travels in a circular path and overcomes handicaps of ordinary guillotine-type shears.

Not only are these machines easier to operate but their design assures smooth straight cuts to hair-line accuracy for years of operation. Their construction is extra heavy, and all modern features are incorporated to provide for ease of operation, minimum maintenance and long life.

Get the facts on these outstanding machines.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
7810 *EAST 282ND STREET • WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE SHEARS

SIMONDS
ABRASIVE CO.
grinding wheels

ALL'S HARMONY
in the grinding department

For better output, these boys know the score. It's Simonds Abrasive Company grinding wheels for the stepped-up tempo of defense requirements. Simonds complete line has everything to keep *your* production in tune with today's needs . . . grinding wheels for every operation, mounted wheels and points, segments and abrasive grain . . . top quality products backed by Simonds Abrasive Company's reputation as a major grinding wheel manufacturer for almost 60 years. Write for free grinding data book listing name of your Simonds distributor.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

the efficiency drops to 85 per cent.

Because of their size and weight the units are shipped disassembled. Erected units are complete in every detail with sealed access doors, ample servicing room and punched flanges for air duct connection. Start-up inspection by a company engineer goes with every unit.

Condenser Tube Life Extended

A longer life for condenser tubes in power plants is the theme of a booklet published by Revere Copper & Brass Inc., New York. Selection of the right alloy tube for each installation is stressed since no single alloy has ever been developed that will stand up best under all operating conditions encountered. The booklet explains the need for protective films to arrest corrosion and the functions of Revere field men as trouble shooters on installations.

Development work in tube alloys is discussed and magnified photographs including photomicrographs are used to show many types of corrosion that lessen tube life. Quality controls in the manufacture of condenser tubes are explained and illustrated and compositions and recommendations for various types of water are given.

Research Bulletin Ready

Accelerated Cavitation Research, a 20 page bulletin describing cavitation-pitting tests is available from Allis-Chalmers Mfg. Co. Tests described were conducted to solve some of the phenomena of cavitation and to determine the relative resistance to pitting of recently developed materials and techniques for applying these materials. Contents of the bulletin are based on a paper originally presented to the American Society of Mechanical Engineers by William J. Rheingans, assistant manager of the hydraulics department. For copies write to the company at 1021 S 70th St., Milwaukee.

Turbine Aircraft Get Attention

Design and operational problems of turbine driven commercial aircraft —both jet and turbo-prop—will be the subject for discussion June 13 in Toronto, Canada, at the semiannual meeting of the Aviation Division of the American Society of Mechanical Engineers. Five papers, by leading technicians of British and Canadian aircraft manufacturers and airline operators, will present "what is probably the most comprehensive and authoritative review of this vital subject yet undertaken," according to Robert B. Lea, Sperry Corp., chairman

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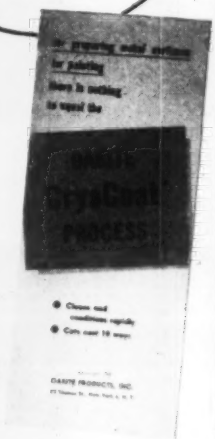

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of the division. Three of the five authors will come from England to deliver their papers, while the other two will represent the Canadian aircraft and airline industry.

The program will be co-sponsored by the Institute of the Aeronautical Sciences, the Society of Automotive Engineers, and the Gas Turbine Power Division of ASME.

Clutch Case Histories Published

Carlyle Johnson Machine Co., Manchester, Conn., offers a case history book showing original equipment installations of their Maxitorq floating disk clutches. Machines and industrial products represented include an ore loader, can seaming machine, packaging equipment, power sweeper, industrial truck, machine tools (milling, chucking, multiple automatic tapping, automatic lathes, shaping, honing) and lumbering machinery—all products of nationally known manufacturers.

Book is illustrated and includes information on the Maxitorq clutch, as well as the Maxitorq automatic overload release clutch—especially designed for protection of high speed machinery such as packaging, labeling and wrapping machines. Machine and product designers who have power transmission problems (up to 15 hp at 100 rpm) may obtain a copy of this book by writing to the company.

Molding Powder Specifications

Information on all plastics molding powders, which conform to the latest military specification, MIL-P-14A, is listed in a booklet, "G-E Thermosetting Molding Powders," published by General Electric's chemical department, Pittsfield, Mass. The 34-page booklet describes a wide variety of grades and gives powder and molded properties. All the grades listed conform to the military specification and meet or surpass its requirements.

Stock Listing Announced

Availability of a 44-page, illustrated stock and price list is announced by Illinois Tool Works, Chicago. Wherever applicable, tools listed are in accordance with the latest ASA standards. A feature of the booklet is its stock list that provide buyers with exact inventory information on quantities available for immediate delivery. To keep this information current, the listing will be revised and reissued quarterly.

In addition to new milling cutters in accordance with ASA standard B5.3-1950, spur gear shaper cutters,

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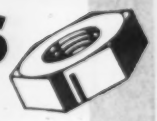

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both 20 degree pressure angle and 14½ degree pressure angle are listed for the first time. Copies are available from Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39.

Air Conditioning Guide

Industrialists who have been planning to look into air conditioning someday can get a helping hand from a 20-page planning guide made available by Westinghouse Electric Corp. All technical information is reduced to understandable, everyday terms. The five vital functions an air conditioning system should perform are listed. The booklet gives these as the vital functions that must be performed: Control temperature and humidity, clean air, circulate air and blend outside air with recirculated air. Components needed to do this job are: Circulating fan, air cleaner, heating or cooling coil, compressor, condenser and humidifier.

What to expect from an air conditioning system comes next and is followed by factors to consider when actually planning a system. Where and when to use a "within-the-space" conditioner, a factory assembled central plant type unit or a field assembled unit are covered in some detail. Copies of the booklet are available from Westinghouse's Sturtevant Division, 200 Readville St., Hyde Park, Boston 36.

Fasteners Lose Weight

Two designs in gang channel and anchor nuts introduced in a lightweight series by Elastic Stop Nut Corp. of America, Union, N. J., effect weight savings ranging from 25 to 30 per cent with no sacrifices in strength, an important factor to manufacturers of airframes and components. With the same high strength of previous designs but with less metal used, the gang channel nut is 30 per cent lighter and the anchor or plate nut is 25 per cent lighter than similar fasteners now commonly used.

Parts are manufactured in conformance with specification AN-366 and are approved for use by aircraft manufacturers. They are available for applications where heavier types of nuts have been used and both are directly interchangeable with other AN parts since they are designed within the same overall envelope dimensions.

The gang channel strip is supplied already assembled in a 24S-T4 aluminum alloy channel blue anodized for easy identification. Even though designed to retain nuts in position over bolts, the channel permits sufficient play to allow for misalignment.

SEYMOUR PHOSPHOR BRONZE

GRADE A (5% tin): Used extensively for springs, diaphragms, bellows, lock washers, cotter pins, fuse clips, clutch discs, screw machine stock, bushings, welding rods, pump rods.

GRADE B (5% tin, free machining): Small gears, pinions, screws, bearings and other similar screw-machine products which must be highly resistant to wear and corrosion.

GRADE C (8% tin): Used for springs on electrical apparatus, diaphragms, welding rod and springs of all kinds where greater elasticity, strength and endurance are required than in the case of Grade A Phosphor Bronze.

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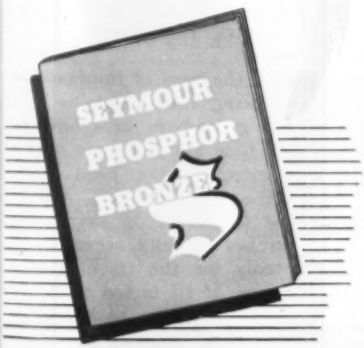

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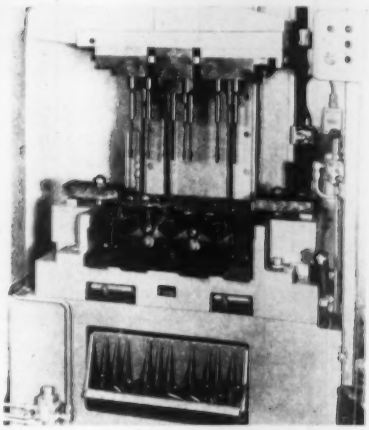
Multiple Broaching Performed

Many people think of broaching machines as largely single purpose units but they can be and often are used to perform multiple operations on either different parts or even on the same part. An example of the latter function is in the setup illustrated. The part is a cylinder head used in engines made by a leading tractor maker in moderate volume.

Job consists of broaching nine valve and push rod guide bores to size, assembling nine valve and push rod guides in place and broaching valve guides to size all without removing the cylinder head from machine. These operations are performed on a type PA, 15 ton, 24-inch stroke assembly press made by Colonial Broach Co., Detroit. In operation the operator slides the head into place in the machine. Retracting type locating pins (interlocked with machine operation) locate the head while it is being locked in position with hydraulically actuated manually controlled clamps.

Nine broaches, six of one size for valve guide bores and three of another for push rod guide bores broach bores on the down stroke of press. At the end of the stroke the broaches are automatically released and drop into a partitioned receptacle in the machine base. The head of machine returns automatically to upper position.

Broaches for the guides themselves are meanwhile placed in an aluminum pallet and the corresponding valve or push rod guides are slipped over the ends of broaches. Pallet is lifted into position under the head engaging the broach ends in the pullers. A lever locks the broaches, pallet is removed and the head moves down. As last action takes place, the guides are pushed into the broached bores with a definite stop for the head assuring they are pushed into exactly the right depth. On the return stroke of the head, the broaches are pulled through the guides finishing them to size. Pallet is lifted in place and the broaches are released, dropping into their respective receptacles in the pallet.



SEVERAL OPERATIONS IN A SETUP
. . . permits working to close limits

A lever at the base of the machine is used to bring the receptacle containing the guide-bore broaches out of machine base and they are manually re-inserted in the head ready to repeat the machine cycle. An advantage of the setup is that valve guide broaches actually serve as inspection tools for the fit of guides in their bores. If fit is too tight the broach pulls the guide back out on the return stroke. This is because it takes less effort to broach the ID of guides than to push the guides into place if the fit is correct.

Performing all operations in the same setup also assures the spacing between all valve and push rod guides (which must be held to close limits) is accurately maintained. Accuracy of the entire operation is indicated by the tolerance on the ID of the finished guides which are held to plus or min-

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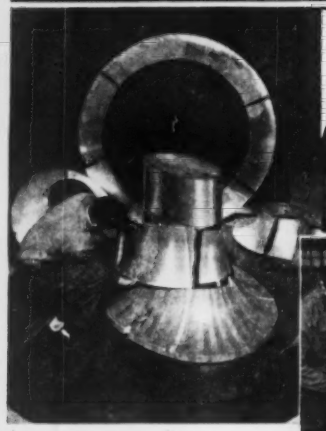

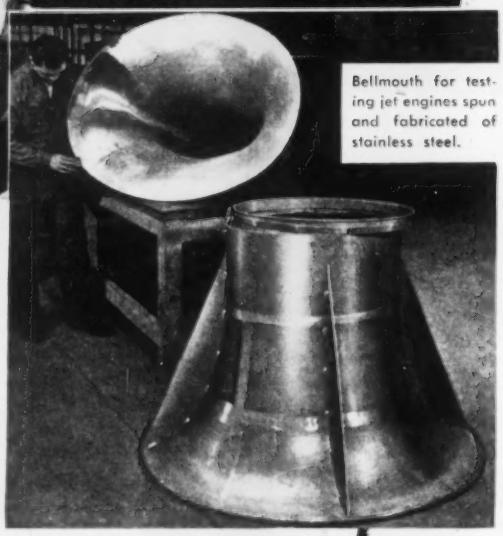

Bellmouth for testing jet engines spun and fabricated of stainless steel.

HIGH tooling costs — months of waiting time — the urgency of the hour — these very real conditions need not bring despair to able designers and alert production executives. Spincraft engineering may well provide you with a welcome solution at a small fraction of conventional fabricating costs and in far less time.

The parts or products you see here reflect what can be done by spinning and fabricating in combination. This resourceful approach provides a wide range of opportunities in many metals that you are invited to discuss with Spincraft engineers. The answer you want cannot be guaranteed, but others have been helped so often and so well that Spincraft has become the world's largest metal spinning and fabricating plant. Call or write

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us .5 tenths. The same tolerance is specified for the bores into which the guides are pressed. This setup would permit processing two different sizes of cylinder heads for two different engines on the same machine. Different broach sizes are used, of course, for the two heads.

Slick Test for Hypoid Gears

At the Beacon, N. Y., laboratories of The Texas Co. research engineers have devised an ingenious method for studying the lubrication of hypoid gears. It's a fast, low-cost test which permits valuable data to be gathered by simulating the actual operating conditions of hypoid gears.

Rather than wear out hundreds of fine gears, the Texaco testers use simple cylindrical rolls which run against one another. They are mounted on parallel shafts. Near them are mounted a meshing pair of oval gears which, in working together, produce a sliding and rolling action of the test rolls. This action is characteristic of hypoid gears. Scuff areas develop on the rolls at the point where the sliding action occurs when lubricated with straight mineral oils or inadequately fortified lubricants. Through careful study of the hypoid action, the engineers have developed the extreme pressure gear lubricants necessary to maintain hypoid gears in top running condition.

Materials Handling Detailed

A catalog of materials handling equipment was released by the Yale & Towne Mfg. Co.'s Philadelphia division. Subjects covered include a general description and application data on Yale's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks, and hand and electric hoists.

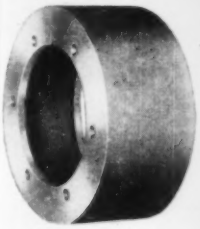
One section describes the various attachments available for Yale industrial trucks that give them versatility in jobs performed.

For a copy of the bulletin write to the Yale & Towne Mfg. Co., Philadelphia Division, 11000 Roosevelt Blvd., Philadelphia 15, Pa.

Quality Control Manual Issued

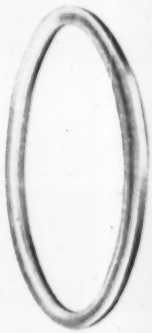
Manual on Quality Control of Materials, sponsored by committee E-11 on quality control of materials is out and takes the place of the ASTM Manual on the Presentation of Data. The new manual is organized in three parts. Part 1 covers the presentation of data, part 2 presents limits of uncertainty of an observed average and part 3 explains the control chart

American Armament Manufacturers call on *CLEVE-WELD* for circular steel products



BOGIE BANDS

STAINLESS STEEL RINGS



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(Up to 100" in diameter)

● American armament manufacturers, when found with a need for circular rolled and welded steel parts call on the Cleveland Welding Company. Cleve-Weld has the specialized equipment and necessary know-how to produce these products economically and efficiently. These vital parts include stainless steel rings for jet aircraft engines, bogie bands for tanks, and other types of rings, bands and weldments from alloy and carbon steel.

Cleve-Weld's 40 years experience in the mass production of these vital parts assures you of expert work in a minimum of time. Write for your copy of the booklet "Cleve-Weld Circular, Rolled and Steel Products." Send us details on your volume requirements and let us quote.

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method of analysis and methods for presentation of data.

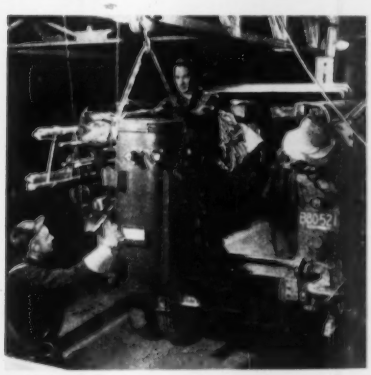
The manual bound in a heavy paper cover may be secured from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, at $1.75 per copy.

Stainless Properties Described

Properties, available forms and fabrication of both its 17-4 PH and 17-7 PH stainless steels are described in a booklet, Armco Precipitation Hardening Stainless Steels. These are the stainless grades that combine excellent corrosion resistance with high strength and hardness, good fabricating characteristics and can be hardened at low temperatures.

Photographs show typical applications for Armco 17-4 PH stainless that can be heat treated at 850 to 900° F to a tensile strength of 190,000 to 210,000 psi and a hardness of 40-45 Rockwell C. Similar data is expanded for 17-7 PH stainless to provide data on the various tempers in which it is available. Soft temper sheets, strip and plate can be formed and deep drawn then hardened by low temperature heat treatment. After such processing this steel has a tensile yield strength of 150,000 to 190,000 psi, a compressive yield of 160,000 to 200,000 psi and a Rockwell C hardness of 40-45. Also outlined are the properties of 17-7 PH stainless

Transformers Shed Extra Weight



REDUCTIONS in weight of transformers similar to the 30 kva unit being loaded on the truck, result from General Electric Co.'s shift to Spirakore construction on all three phase units rated 150 kva and less, 15 kv and below. Cold-rolled, oriented grain steel is used in their construction. In the Spirakore design flux is parallel with the core steel throughout most of the magnetic circuit. The effective number of gaps is reduced and the gap area is large resulting in lower exciting current

steel wire. Copies can be obtained from Armco Steel Corp., Middletown, O.

Gray Iron Welding Facts

Welding, Joining and Cutting of Gray Iron, the second of a series of three technical manuals on gray iron castings to be published by the Gray Iron Founders' Society was recently released to members. The 40-page book describes new processes and improved techniques for successfully welding gray iron. C. O. Burgess, author, says the new processes described in the manual make it possible to extend all the advantages of welded fabrication to gray iron components.

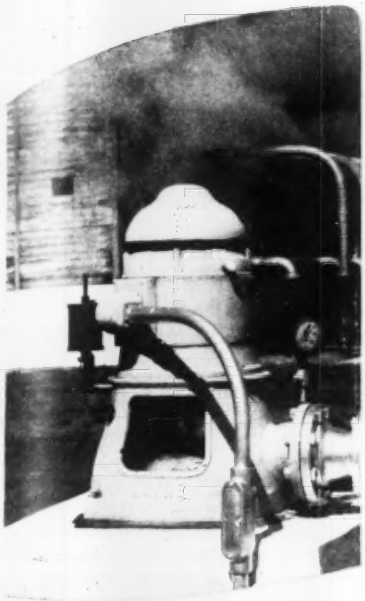
Subject matter includes gas, arc, inert-gas, braze-weld, brazing, thermit, flash welding, etc. The processes open up new design possibilities for successfully joining gray iron to other metals and facilitate repair and maintenance operations so important in the present emergency. Copies for nonmembers are available for $1.50 from the society at 210 National City—E. 6th Bldg., Cleveland 14.

Sharp Bends Need Not Fracture

Pressure of defense production is forcing many metal fabricators to use and work with unfamiliar metals. One of the outgrowths of this condition is the fracture at bends of strip and sheet, cold-rolled to tempers, for spring applications. In most cases bends are at approximately 90 degrees and the forming tool is knife-edged, practically void of any radius.

Metallurgical department of Riverside Metal Co., Riverside, N. J., under the direction of H. S. Freynik, recently solved the problem of bending a nickel silver switch element to a small radius without fracture. The alloy used (ASTM B122-49T, alloy No. 4) comprises 55 per cent copper, 18 nickel and 27 zinc. Temper was extra hard with a corresponding tensile strength of 102,000 to 115,000 pounds per square inch. The blanking direction of the part was 45 degrees to the direction of rolling. The part was bent at 90 degrees and a knife-edged forming tool was used.

The problem was to form the part without fracture and still retain the same blanking direction and basic tools. Solution of this problem was the introduction of a 0.005-inch radius at the bend. Mr. Freynik advises against using 45 degrees as a blanking direction for parts, since the bending properties decrease very rapidly at this point. The best forming properties, of course, are with the direc-



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Layne is the Nation's greatest organization engaged exclusively in the designing and building of modern high efficiency well water systems. Layne has made more installations than any other firm in the world and is widely recognized as being the best qualified for any size job from a single unit to a dozen—or even hundreds. If you need more water, contact Layne or send for new catalogs or bulletins. Address

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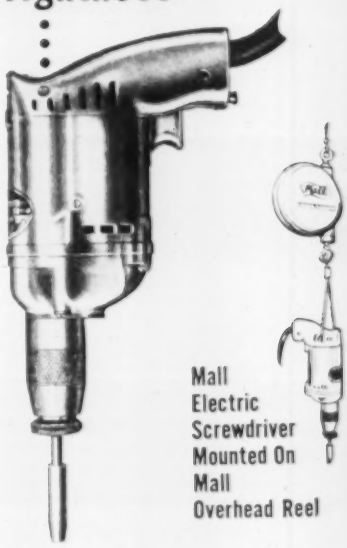

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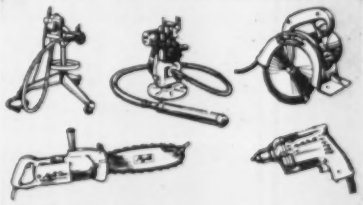

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tion of rolling of the cold-rolled sheet or strip. However, a blanking direction of 30-35 degrees provides the best combination of economy, forming and spring properties.

Huge Mill Heads for Italy

A huge vertical boring and turning mill was constructed recently by Baldwin-Lima-Hamilton Corp., Hamilton, O. The Niles machine has a maximum swing of 43 feet 5 inches with a 33-foot table diameter and a maximum height under tools of 12 feet 2 inches. Total length over the operator's platforms at each end of the crossrail is 65 feet, total height overall is 25 feet and the bed extends 9 feet 6½ inches below the top of the table.

The 1,250,000-pound machine is being shipped to Officine Di Savigliano, Turin, Italy, where it is to be used primarily for turning parts for water power generators and turbines. The use of the machine was recently investigated and approved by the Economic Co-operation Administration and the State Department.

Table, which is 3 feet thick and had a rough weight of 267,900 pounds is made in three sections to facilitate shipment. Two similar segments 11½ feet wide are bolted, tongued and doweled to a center section 10 feet wide. The table is rotated by a 20-degree helical gear approximately 24 feet in diameter. This gear, which has 288 teeth of one diametral pitch, was cast in halves and joined on the 20-degree helical angle.

Drive for the table is through two pinions located 180 degrees apart on the centerline that is parallel with the face of the crossrail, by two dc 50/75-hp motors, balanced electrically to equalize the drive. One back gear is built into the drive mechanism from each motor, thus providing a table speed range of 0.125 to 5 rpm. Back gears are enclosed in boxes attached to each side of the center portion of the bed. The back gear clutches are shifted simultaneously by electric motors operated by means of control buttons. Drive motors and all drive shafts are vertically mounted and run on antifriction bearings.

The table is supported on the bed by a wide track of large diameter which is flooded by oil under pressure. An additional inner track is provided with means for adjustment. The bed, which is cast in four sections, supports the table on the two center sections and the two outer sections support the housings.

The two housings, each cast in one piece and weighing 90,900 pounds, are tied together at the top by a

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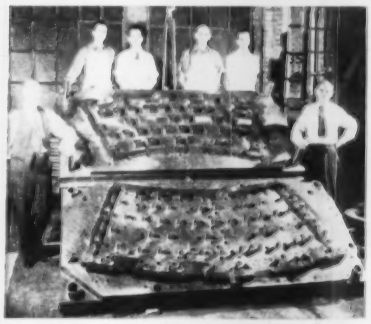
Die Is Biggest Ever Built by A-C

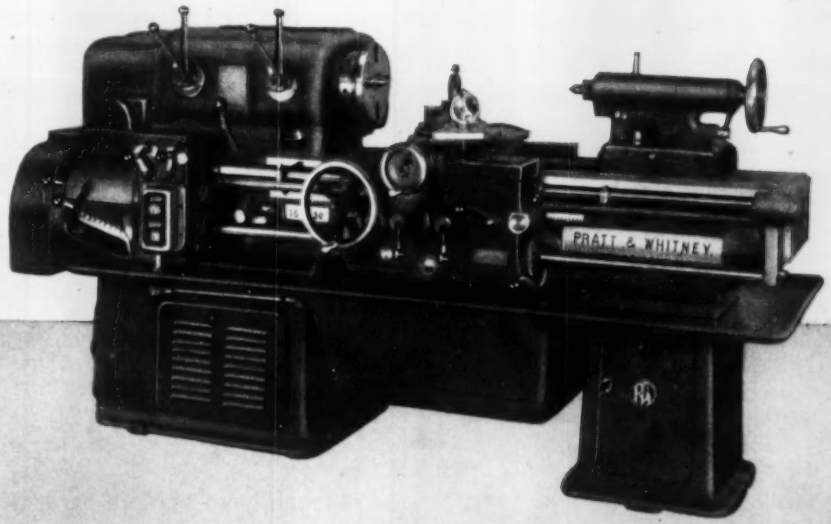


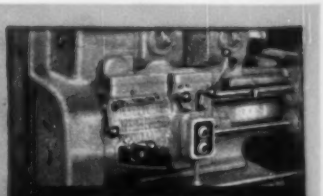
WEIGHING 9 tons, this lamination die is the largest ever produced at Allis-Chalmers Mfg. Co., Milwaukee. At the extreme left of photo is Harry Urban who designed it. The die will be used to punch out rotor rim laminations for two giant water wheel generators being built for Hoover Dam. A press with a capacity of 700 to 800 tons is required to use the die which required a total of over 2000 hours work on the part of the four skilled diemakers shown in the rear

Model "C"

PRECISION LATHES

12 INCH 14 INCH 16 INCH





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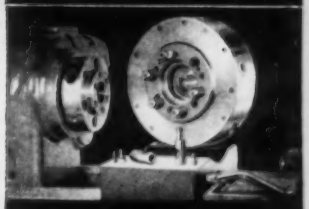
Smooth, silent shift to any thread or feed indicated on direct-reading index plate. All controls grouped for convenience.

SUPER-PRECISION SPINDLE

Mounted at front end in two pre-loaded precision bearings, at rear end in anti-friction type needle bearing.

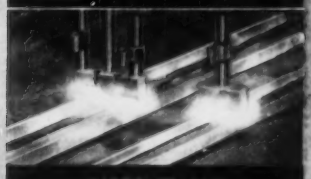


CAM-LOCK SPINDLE NOSE

A Pratt & Whitney development now standard on most quality lathes. Provides greater rigidity in holding chuck or face plate on spindle. Safer, more convenient mounting — cannot "freeze" on.

REMOVABLE APRON FRONT

safeguards initial accuracy. No need to remove apron assembly, or disturb the separate precision lead screw, when making adjustments.



HARDENED AND GROUND WAYS

provide permanent stability and accuracy. Finish-grinding on special machines assures perfect bearing and superb smoothness.

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"THERE'S NO BETTER-PAYING INVESTMENT THAN THE RIGHT TOOLS FOR THE JOB."

RELENTLESS PRODUCTION SCHEDULES

and

SMALL PRECISION GEARS

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FEELING FUTILE?

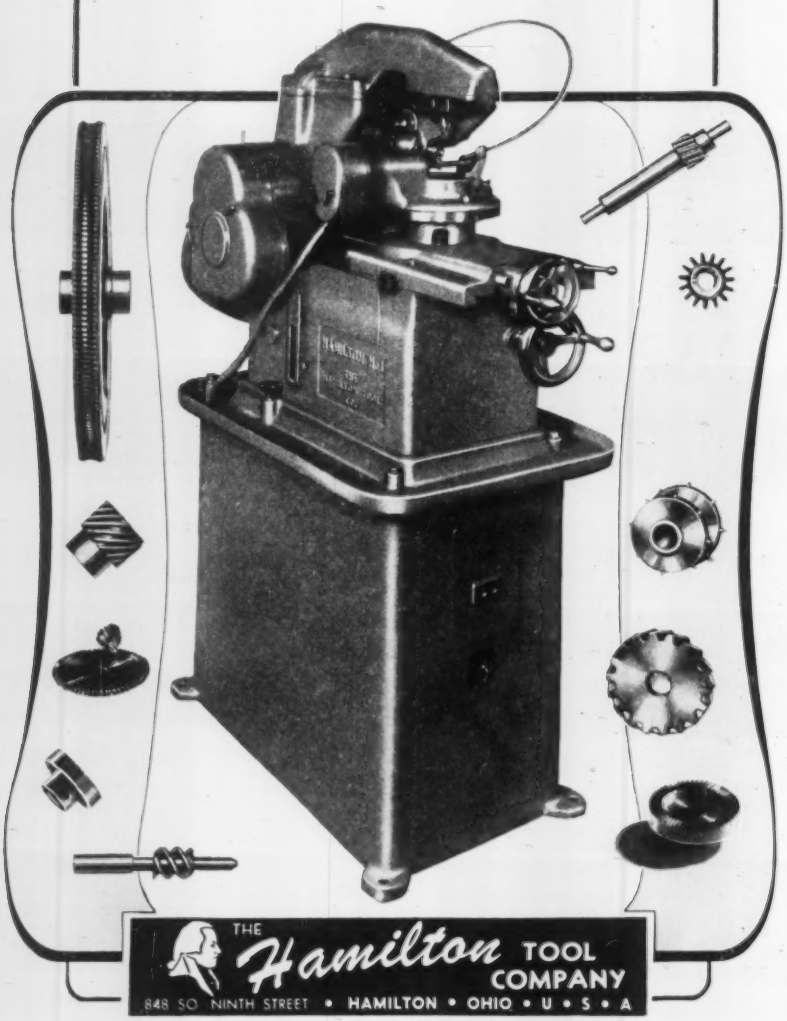
Unusual conditions are usual now. You are *expected* to build small, precision mechanisms on fast production schedules. And you will be expected to produce them better and faster tomorrow. But why worry? All you will need will be better machines.

MORALE BOOSTER

And better machines are here *now!* The Hamilton No. I Precision Small Gear Hobber will *solve* your problem in respect to gears. All gears, regardless of shape, if they are small and exact, can be produced faster on the Hamilton No. I.

FREE HELP

You don't expect full information about such a machine in the small space of one advertisement. But full information is available . . . ten printed pages of it . . . and offered to you free. Write for our Bulletin No. H-492, with supplement. Do it now . . . tomorrow you may need to *know!*



THE Hamilton TOOL COMPANY

848 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

heavy cross brace. A built-up structural girder is bolted between the housings near the top for additional stiffness. A 30-hp motor on the cross brace drives four vertical screws which elevate the crossrail. Four ¾-hp motors clamp the crossrail to both inside and outside of each housing. The crossrail was cast in one piece with an overall length of 57 feet 7 inches and weighed 134,650 pounds in the rough.

Gas Turbo-Generator Ordered

Sale of the largest gas turbine-generator yet ordered for the commercial generation of electric power is announced by D. W. R. Morgan, vice-president of the Westinghouse Electric Corp. at South Philadelphia, Pa. The huge 15,000-kw unit will be installed in the Bartlesville area of the Public Service Co. of Oklahoma. Natural gas from the Oklahoma fields will provide the heat energy the new turbines will convert into electrical power. It is scheduled for delivery in about three years.

The 700,000-pound turbo-generator installation will consist of the gas turbine as the primary source of power, driving a hydrogen-cooled generator. The gas turbine will comprise high and low pressure turbines driving high and low pressure compressors, respectively, with the high-pressure turbine also connected to drive the generator. Intercoolers will reduce the temperature of the compressed air between stages of compression, and a regenerator will apply exhaust-gas heat to the air before it enters the combustor to reduce consumption of fuel.

Turbines will operate at a temperature of 1350° F, 300° higher than the hottest steam temperatures in use today in electric generating stations, and about twice as high as the temperature of the average steam generating plant. Speed of the turbine will be 3600 rpm. At full load the compressors will draw in 7½ tons of air every minute.

Regulators Get More Accurate

Regulator controls that are 99 per cent accurate regardless of operating changes in temperature or load are being supplied by General Electric Co., Schenectady, N. Y., as standard equipment on all station type induction and step regulators. They are designed to meet rigid requirements imposed by American Standards Association for class 1 accuracy.

They allow feeders to carry heavier loads for greater distances. This is possible with class 1 accuracy because more feeder drop can be

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HOPPER FEEDING UNITS

The SOLUTION may be tied in with one of our FOUR MAJOR PRODUCTS!

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2811 WEST FORT ST., DETROIT 16, MICHIGAN

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1926 Our 25th ANNIVERSARY 1951

DETROIT POWER SCREWDRIVER CO.

tolerated without at any time exceeding permissable voltage limits. High accuracy control for regulators permits substantial savings. A recent power company survey indicated that an increase in regulator accuracy of only 1 volt (on a 120 volt basis) would be worth $3 to $4 per circuit kva regulated.

Speedway Has Zyglo Inspection

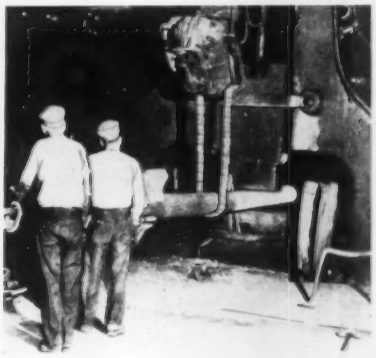
Magnesium wheels, exhaust valves, aluminum frames, etc., of racing cars at the Indianapolis Speedway will get inspected by Zyglo unit in addition to the Magnaflux inspections used for many years. Both types of inspection equipment are made by Magnaflux Corp., Chicago. According to the rules of the track certain parts must be inspected before cars are permitted on the track as a safeguard for both drivers and spectators. Zyglo is a fluorescent penetrant inspection method which may be applied to magnetic or nonmagnetic parts.

Stainless Welding Detailed

A handbook published by Electrode Division, McKay Co., Pittsburgh, and entitled "The Welding of Stainless Steels" gives complete details of stainless steel arc welding in its 48 pages. It discusses and illustrates through charts such valuable technical information as the metallurgical background, specific uses of alloying elements and facts in general pertaining to the welding of stainless steels.

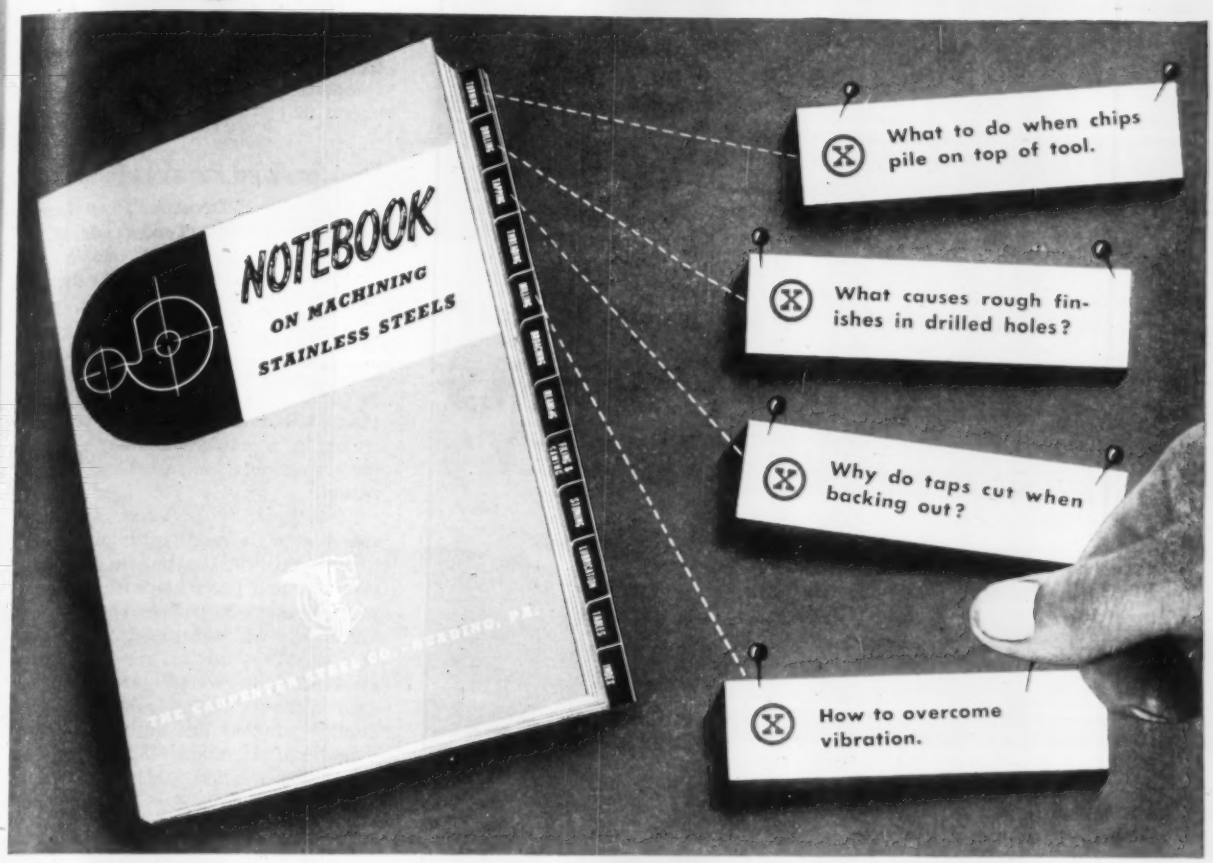
Also shown in detail are the AISI

Military Output Takes Big Slice



PROPELLER shaft for a small naval vessel is shaped on a 6000-ton drop steam hammer at Kropp Forge Co., Chicago. The nation's forge shops are busier now than they have been since 1944 and an increasingly large portion of their output is going to the defense effort. Kropp officials report military work accounts for 42 per cent of all production

X MARKS THE SPOTS


NOTEBOOK
ON MACHINING
STAINLESS STEELS
What to do when chips pile on top of tool.
What causes rough finishes in drilled holes?
Why do taps cut when backing out?
How to overcome vibration.

Where You Solve Many Machining Problems with a 3¢ Stamp!

Finding the right answers to chatter marks, poor tool life or off-tolerance work isn't always as easy as you'd like it to be.

Because of that, because of the need for more and more information to help machinists overcome Stainless production problems, Carpenter has published this "NOTEBOOK on Machining Stainless Steels". It is just one of our services aimed at helping you take the problems out of Stainless production.

If you would like a personal copy of the NOTEBOOK, just call your nearest Carpenter representative. He will be glad to give you a copy, if you don't already have one. And in the shop, he can give you real help on specific jobs that are unusual or troublesome. For training programs, the NOTEBOOK is available at 50¢ per copy.

The Carpenter Steel Company, 139 W. Bern St., Reading, Pa.
Export Department: The Carpenter Steel Company, Reading, Pa. "CARSTEELCO".

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Since we have been producing our own abrasives in our Canadian Electric Furnace Plant, coupled with maximum utilization of new developments in resin bonds, Electro's chemists and engineers have had a latitude in development work that they never had before.

The gains they have achieved in faster, cleaner cutting at lower temperatures are out of all apparent proportion to the fractional improvements in wheel composition, shape and size selection.

If a run is ahead of you on multiple castings of a given type or grade of metal, identical in shape and size, let us send a Field Engineer to show you how much you can gain with Electro Portable Wheels engineered to the job in hand.

Comparable gains for cutting-off, rough and precision grinding are demonstrable. Write, wire or phone. Job-side cooperation by an Electro Field Engineer places you under no obligation whatever.

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Electro HIGH-SPEED RESIN BONDED GRINDING WHEELS

analyses, analysis range, color guide and tensile data of the various groups of stainless steels. Included in the 48 pages are pertinent data concerning uses and specifications of each type of McKay stainless steel electrode and information about the three types of coating used for each electrode. Manual is available from the company at 330 McKay Bldg., Pittsburgh 22.

Standardized Punches Made

Pivot Punch Division, Pivot Punch & Die Corp., North Tonawanda, N. Y., announces that it will supply any shank type in removable or headed punches in any point length, point diameter or overall length at standard prices which are guaranteed to be lower than the users' cost to manufacture. The company says more than 276 million punch sizes and styles in a choice of four qualities were required to complete standardization.

First quality punches are high speed steel, straight-ground parallel to the axis of the punch for added strength and precision with the company's patented whipsleeve to absorb vibration and add punch life. Second quality punches are high speed steel straight-ground parallel to the axis without the whipsleeve. Third quality punches are high speed steel cylindrically ground. Fourth quality punches are alloy steel cylindrically ground.

British Hold Gas Turbine Courses

Britain's School of Gas Turbine Technology is to hold two special international courses this summer for overseas engineers.

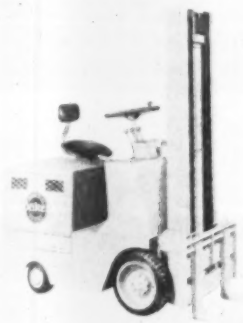
Both courses will last for three weeks and will deal with the design and application of gas turbines for all purposes. The first starts on May 27 and the second on Sept. 16.

The School of Gas Turbine Technology, which was founded in 1944 at Lutterworth in the workshops where Sir Frank Whittle and his team carried out their early experiments with jet engines, moved to new premises at Farnborough, Hants last October. Students from America, Canada, South Africa, France, Argentine, Belgium, Holland, Spain, Italy, Israel, India, Pakistan, Sweden, Denmark, Norway, Switzerland and Turkey have attended previous international courses. The School is administered by the British Government owned company, Power Jets (Research & Development) Ltd., who hold over 400 inventions and 2500 patents in the field of gas turbine technology in about fifteen countries.

New Products and Equipment

Announces Light Fork Truck

Baker Industrial Truck Division, Baker-Raulang Co., 1250 W. 80th St., Cleveland O., announces type FS-20 fork truck for applications up to 2000 pounds and 48 inches long. Weight of the truck with battery included is 4950 pounds and machine is 83 inches high, 32½ inches long. Outside turn-



ing radius of the machine is 65 inches and right angle turns must have 79½ inches plus the length of the load.

Initial lift loaded is 65 inches and telescoping lift is 130½ inches loaded. Recommended battery is 36 volt, 350 ampere hours. Braking is accomplished by reversing the travel controller, saving wear on the service brake and providing a safety feature when descending ramps.

Check No. 1 on Reply Card for more Details

Quicker Gear Shaving

A means of semiautomatic loading applicable to Red Ring diagonal gear shaving machine made by National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., increases

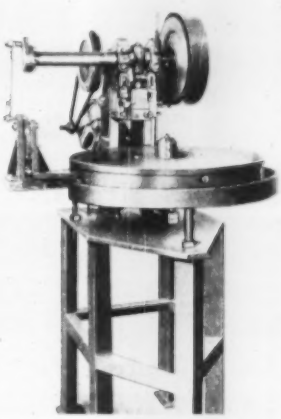
the production rate of shaved gears. Semiautomatic loading is accomplished by equipping the machine with an air-actuated tailstock, the automatic splash guard and a prelocator and stripper which supports the work until it is engaged by the advance of the tailstock.

After the operator lays the work gear on the prelocator, he pushes the start button. This causes the splash doors to close, the tailstock advances to engage in the work, the coolant flow starts and shaving begins. At the end of this shaving cycle the cutter stops, the coolant flow stops, the tailstock retracts and the splash doors open, all automatically.

Check No. 2 on Reply Card for more Details

Dial Feed Press

O. F. de Castro & Associates, 1517 S. Santa Fe Ave., Los Angeles, Calif., announces the new Speedex 5-ton dial feed punch press. Press is available in either 1 or 2-inch stroke. Dial feed is mounted directly on the frame of the press and connected to the crank-



shaft by means of an adjustable rod with an accentric drive.

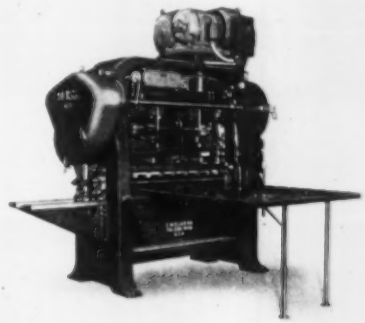
Timing on the index feed is adjustable by rotating the timing cam on the crankshaft of the press. Speedex index feed is accurate to 0.0002-inches and has a locking arrangement by which it locks in position at each stroke of the press, and remains locked while the press is doing the work. Dial feed presses can be furnished with either 12, 15 or 24-inch diameter index feeds.

Check No. 3 on Reply Card for more Details

High Speed Perforation

A 150-ton high speed perforating press to punch slots, rounds or ovals, either in straight rows or with alternating rows staggered is a development of the E. W. Bliss Co., Canton, O. It operates in a speed range from 100 to 200 spm with a variable speed drive and can handle a maximum sheet width of 54 inches. The stagger motion is accomplished by feeding the sheet straight through the press and by moving the punch and die from side to side. The amount of stagger is adjustable. A count adjustment can be set to stop the press automatically after a predetermined number of rows have been punched.

Precision feeding mechanism consists of entry and exit feed rolls of hardened alloy steel, driven by a feed crank adjustable for different

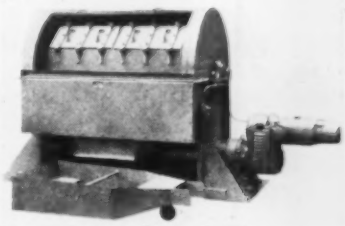


feed increments. The stroke of the slide can be adjusted for different stock thicknesses. A releasing mechanism, provided for the upper gripping rolls, releases both rolls simultaneously. Feed rolls can be slid on to a support bracket extending to the side of the press for easy installation of die sets from front or back of press. A die can also be inserted through the uprights.

Check No. 4 on Reply Card for more Details

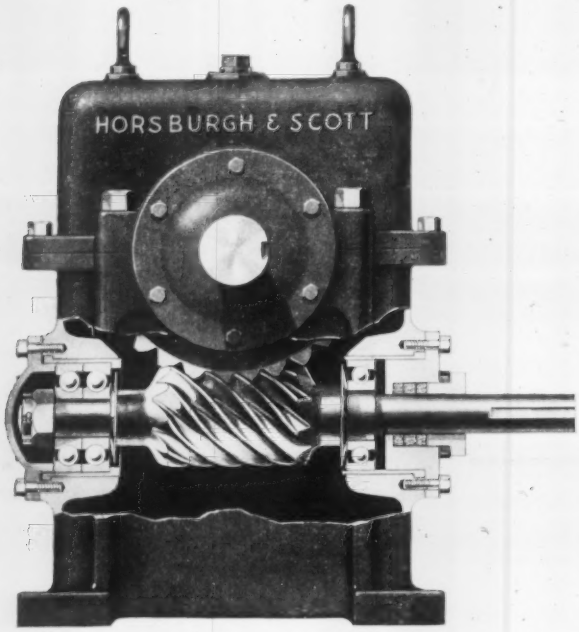
Deburring Safety

Convenience, efficiency and safety are provided by enclosed deburring barrels announced by the Belke Mfg. Co., 947 N. Cicero Ave., Chicago 47, Ill. Turning a hand crank adjusts the enclosed drive to any speed from 10 to



40 rpm. Aluminum doors are light in weight and easily locked for watertight closure. Wire mesh doors are furnished to be used in place of aluminum doors for draining or rinsing the work. A steel chute below the barrel guides drainage, media or work into a tricycle dump pan.

Model illustrated has two compartments lined with hard maple. Each



efficient, long life . . .

WORM GEAR SPEED REDUCERS

by Horsburgh & Scott

Every modern element for reducing friction and other losses is incorporated in these reducers...hardened and accurately ground worm made from special case hardening steel, accurately made gear from chilled bronze to H & S specifications, anti-friction bearings, accurate alignment, smooth streamline interiors and proper lubrication. Due to its glass hardness, worm wear is nil...due to its accuracy, gear wear is negligible. Throughout their long life these reducers maintain their initial high efficiency.

10 ADVANTAGES

Extreme Simplicity	Extra Strength
Compactness	Low Maintenance
Efficiency	Oil-tight Housing
Long Life	Quiet Operation
Smooth Transmission	Wide Range of Ratios

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

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Send note on Company Letterhead for Speed Reducer Catalog 46

compartment is 22 x 29 inches across the flat surfaces. It can be furnished with one to four compartments. Top of the case slides down to form complete enclosure when barrel is in operation. Magnetic brake and reversing switch are optional features.

Check No. 5 on Reply Card for more Details

Dispenses Strapping Electrically

Motorized dispensers of ¾-inch and 1¼-inch heavy steel strapping are available from the A. J. Gerrard & Co., Melrose Park, Ill. Device uncoils banding by an electrically driven motor and when desired length is obtained operator can cut it with a manual shear. Uncoiling long lengths

of strapping normally requires two men but 430 coil dispenser may be operated by one man.

Positive chain drive is employed with 110-volt ac motor. Special motors for special currents are available. Dispenser is loaded by rolling coil of strapping into cradle and threading end of the strap through the exit slot.

Check No. 6 on Reply Card for more Details

Short Stroke Hammer

Chambersburg Engineering Co., Chambersburg, Pa., announces a Ceco-Drop specially suited to the production of cutlery, holloware, jewelry, etc. Model C is a piston-lift gravity drop hammer, designed for production of work requiring short snappy strokes, permitting fast, accurate production. To provide for wiping or polishing the top die this model has a safety rest attached to the left hand frame, easily swung into position under the ram when elevated.

Ram is lifted by a piston operating in a cylinder and falls by gravity. Piston rod is held by a special clamp when not operating. When operator steps on treadle an air valve releases the clamp and the rod rides

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REDUCE PRODUCTION COSTS
INCREASE PLANT EFFICIENCY

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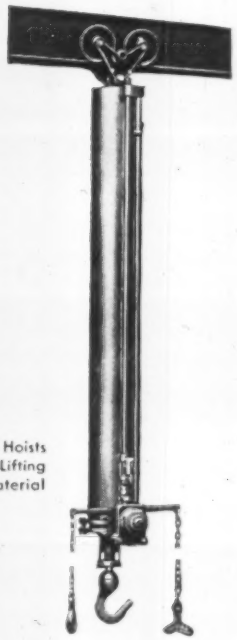
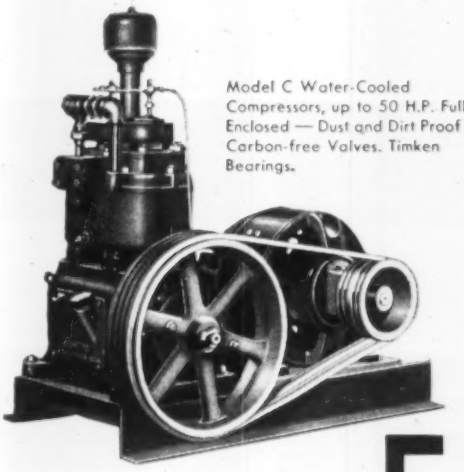
CURTIS AIR COMPRESSORS AIR-OPERATED CYLINDERS & HOISTS

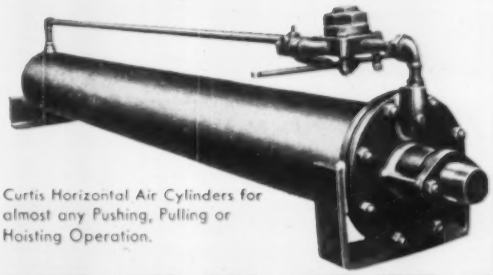


Curtis Vertical Air Hoists Provide Low-Cost Lifting or Lowering of Material or Machines.

Curtis Model F Air Compressors are available as either electric or gasoline motor-driven units (electric motor-driven portable or stationary). Up to 10 H.P.

Model C Water-Cooled Compressors, up to 50 H.P. Fully Enclosed — Dust and Dirt Proof — Carbon-free Valves. Timken Bearings.





Curtis Horizontal Air Cylinders for almost any Pushing, Pulling or Hoisting Operation.

Throughout the world, Curtis equipment has stood the test of time, because it is precision made from top quality raw materials with 97 years of "know how."

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☐ **AIR HOISTS**
Stroke? ☐ Capacity? ☐

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Stroke? ☐ Capacity? ☐

☐ **AIR COMPRESSORS**
Capacity? ☐ Pressure? ☐
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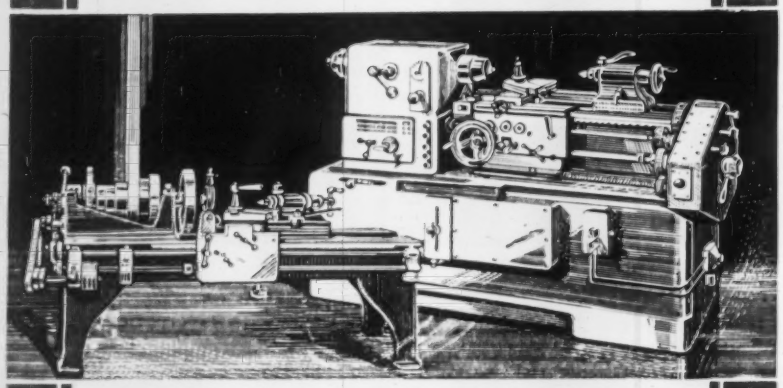
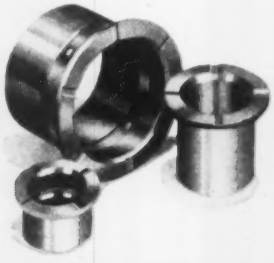
JOHNSON BEARINGS
1901-1951



Getting Today's Higher Speeds Required Progress in Sleeve Bearings

The advanced engineering of modern machine tools was made possible by the improvement of materials and production methods for the many component parts. Johnson Sleeve Bearings are examples of this fifty years of progress . . . new bearing styles, improved design, refined alloys, new materials, and greater precision. Most of the Johnson Bearings of today show only superficial resemblance to the bronze castings and heavily babbitted bearings of fifty years ago. The wide experience and "know-how", accumulated over the years by working with manufacturers in all fields, probably can be helpful to you. Johnson engineers will gladly study your requirements and make recommendations on the types and designs of bearings needed. Write, wire or phone for an appointment.

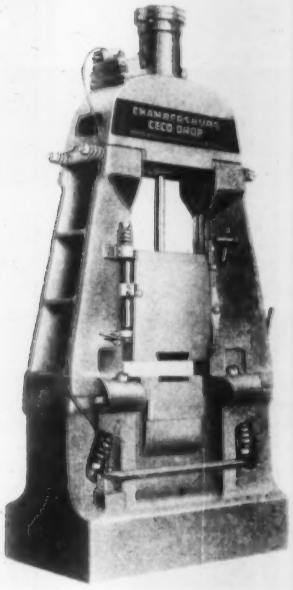


SLEEVE BEARING HEADQUARTERS *Since* 1901

Johnson Bronze

550 SOUTH MILL STREET • NEW CASTLE, PA.

freely up or down. A safety cylinder cover keeps a cushion of live air constantly above the piston for protection. Stroke is controlled by quick positioning dogs mounted on a pivoted rocker which is in turn connected to an operating valve. A shock absorber connected to the



rocker neutralizes shock and vibration. Where it is desired to change from long stroke to short stroke or vice versa a special air-operated dog controlled by a pushbutton on the treadle may be attached. Pressure on the button changes the kind of stroke. Release of the button reverts to the standard stroke.

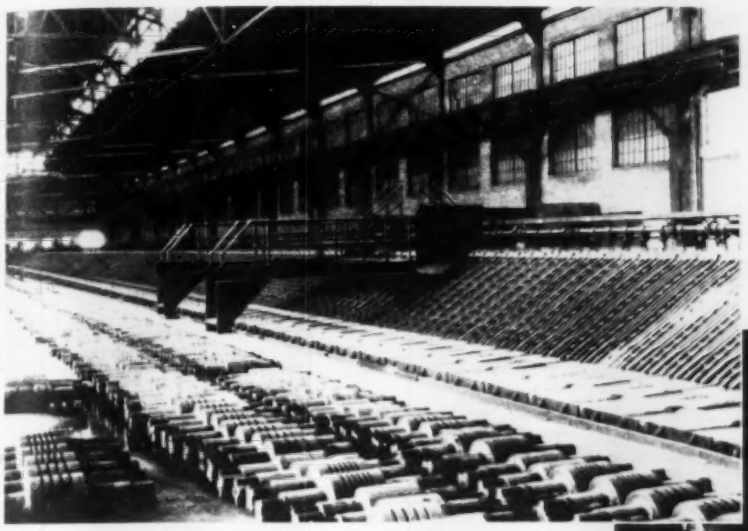
Check No. 7 on Reply Card for more Details

Powdered Metals Presses

Two hydraulic presses for compacting powdered metals and other compounds are announced by Arthur Colton Co., division of Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, Mich. They are known as Colton-Haller hydraulic press 6-125 and 6-100, with 125 and 100 ton pressure capacity respectively. They are built by Colton in collaboration with John Haller, president of Michigan Powdered Metal Products.

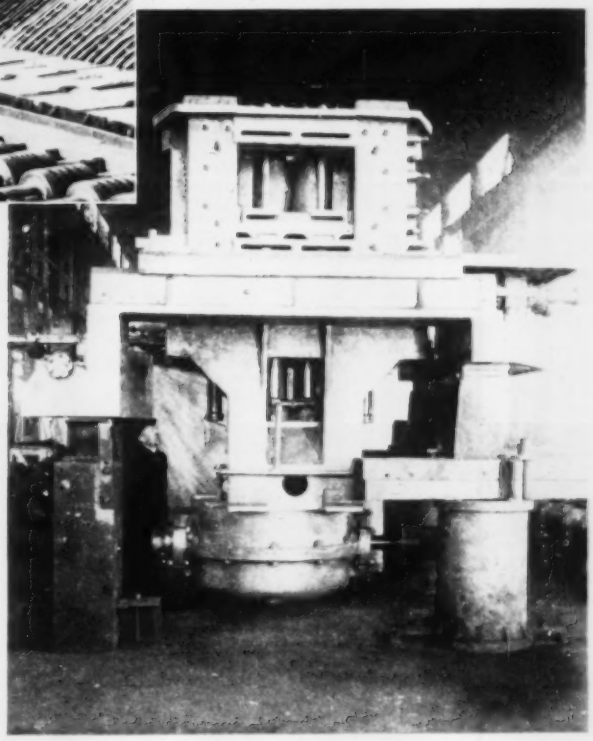
Presses are four tie-rod type with 6-inch die fill and one pressing motion from the top and one pressing and one ejection motion from the bottom, and stationary core rod. Die opening through the table is 8¾ inches with 10¾-inch opening for the flange. Both presses have dual concentric lower cylinders, the outer for compacting and the inner for ejection of compacts. Stroke of each cylinder

Treadwell



COOLING BED FOR 14-9 INCH MERCHANT MILL

Complete continuous and semi-continuous merchant, bar, and billet mills with vertical stands eliminating complicated twist guides and twisting of material, producing a quality product.



VERTICAL ROLL STAND

OTHER PRODUCTS

Manipulators, Mill, etc.
Mills, Blooming & Billet & Slabbing
Mills, Merchant & Bar
Mills, Rod
Mills, Sheet
Mills, Strip (Cold)
Mills, Strip (Hot) & Skelp
Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers
Coilers & Reels
Conveyors, Coil
Drives & Pinions
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Cooling
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)
Special Machinery
Steel & Iron Castings

BETTER GRADE MACHINERY

Treadwell Engineering Company

EASTON, PA.

SALES AND ENGINEERING OFFICES:

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CEntral 6-9784

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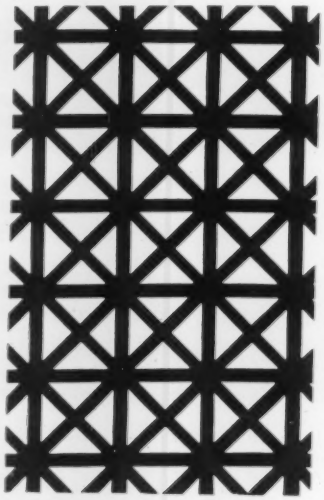
NEW YORK 6, N. Y.
WOrth 4-3344

1217 FARMERS BANK BLDG.
PITTSBURGH 22, PA.
ATlantic 1-2883

Hendrick Ornametal

TRADE MARK



This is a lightweight type of grille especially suited for radiator enclosures, stove panels, kitchen cabinets, clothes and broom closets, lockers, and similar applications. It is made of a special bright finish, cold rolled steel, suitable for painting or plating, and is available in a wide range of stock size sheets and gauges.

Hendrick Ornametal can be furnished in a variety of attractive designs, the one illustrated being "Smalcane." Write for full information.

SEE OUR CATALOG IN SWEET'S

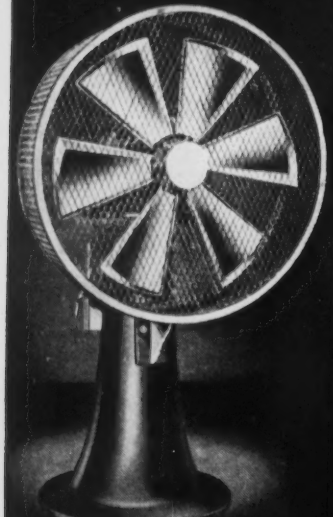
HENDRICK

Manufacturing Company

30 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids



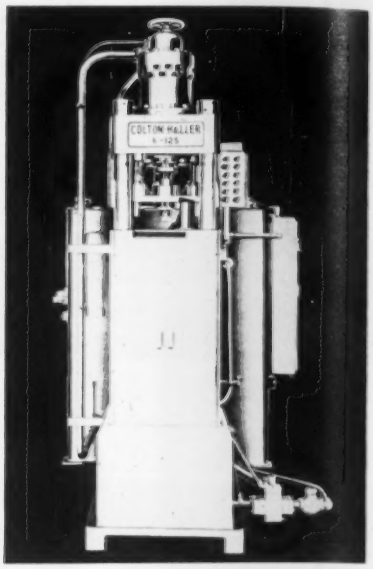
• Ruggedly made to withstand severe use .... advanced designing in fan blades .... rigidly mounted and securely locked in place .... well balanced and readily portable by overhead crane or auxiliary truck. Stationary and oscillating types with either pedestal (floor mounting) or bracket (wall mounting).

B. F. Perkins & Son, Inc.
HOLYOKE, MASSACHUSETTS
Manufacturers of Industrial Machinery Since 1873

PERKINS MAN COOLERS

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE

is adjusted and locked externally. They have a 3000 psi hydraulic system for final pressing and a 600 psi large volume, primary pressure for fast approach speeds. Complete



cycles are approximately 12 per minute with full 6-inch die fill and approximately 18 per minute with 3-inch die fill.

Check No. 8 on Reply Card for more Details

Grease Lubrication Added

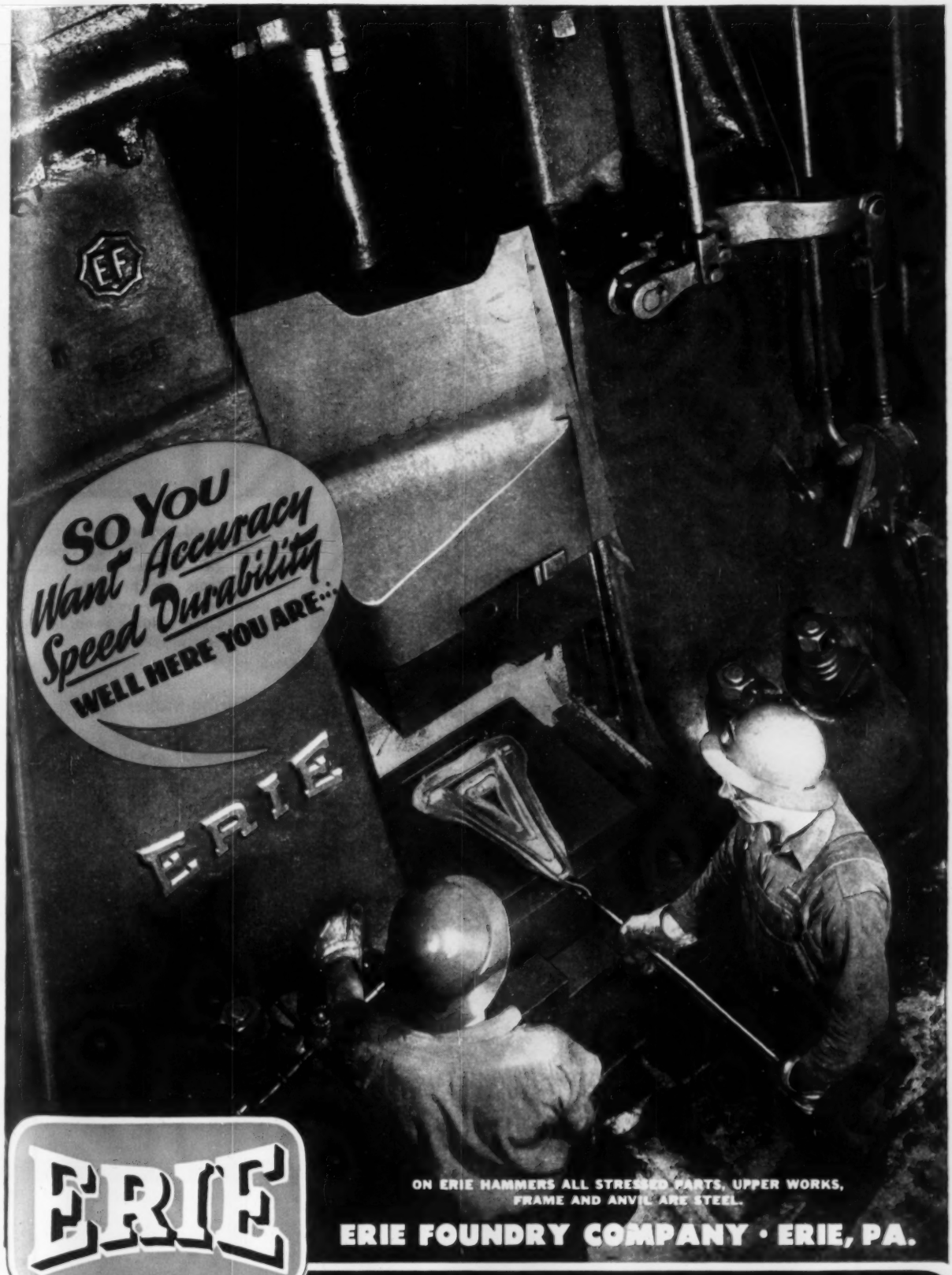
McCord Corp., Detroit, Mich., is adding 4, 8 and 16-quart grease lubricators to its line. Lubricator of 4-quart capacity is available with one to six grease outlets; the 8-quart pump has 7 to 12 outlets and 13 to 24 outlets are features of the 16-quart lubricator. Maximum working pressures of these devices is 1500 psi.

Pumping capacity is 0.2 cubic centimeter maximum per stroke of the pump. Whenever the lubricator is to operate against a back pressure of air or gas the lubricator must be fitted with a check valve in the delivery line at the terminal.

Check No. 9 on Reply Card for more Details

Welding Gantry

Reed Engineering Co., 1003-17 W. Fairview Ave., Carthage, Mo., has developed a movable gantry for automatic submerged melt welding. Maximum flexibility is provided by installing the welding generator or transformer and flux recovery unit within the gantry column, leaving only the initial electrical power supply to be brought into the fixture through drag cables or trolley bars. Gantry moves on standard gage railroad track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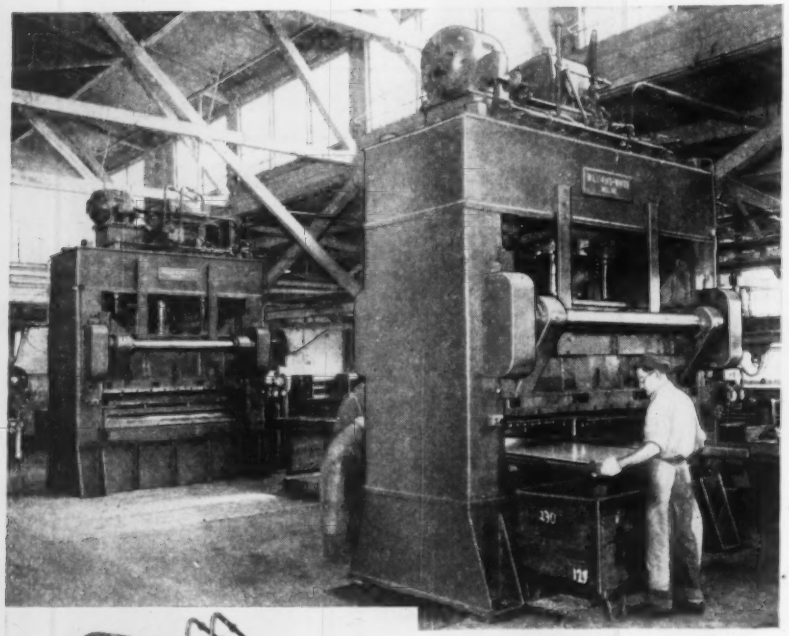
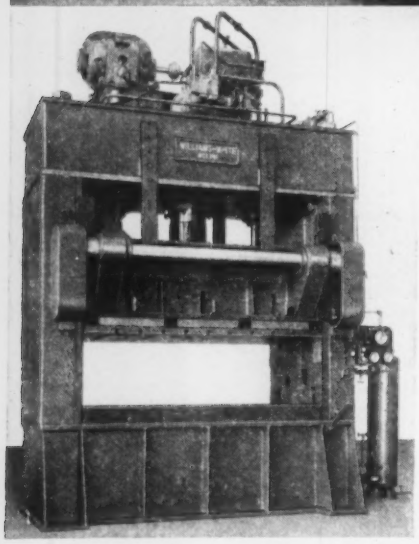
ERIE FOUNDRY COMPANY • ERIE, PA.
ERIE BUILDS Dependable HAMMERS

WILLIAMS-WHITE *Hydraulic Press*

- **Capacity, 250 Tons, for efficient forming and blanking operations**





- **Area of bed, 90" x 54"**
- **Stroke, maximum 16"**
- **Rapid traverse, 360" P.M.**
- **Full pressure, 58" P.M.**
- **Mechanical paralleling device to permit handling off-center loads**
- **Hydro-pneumatic cushion**
- **Knock out bars**

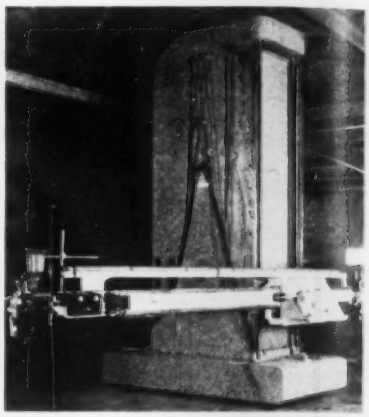
The WILLIAMS-WHITE Hydraulic Press, shown above, has been in service for several years turning out stove parts. Equally adaptable to defense material production. For information regarding this and similar machines . . . presses, bulldozers, punches, eye-benders, hammers, etc. . . . write our factory.

MAKERS OF QUALITY PRODUCTION TOOLS FOR NEARLY 100 YEARS

WILLIAMS-WHITE & CO.
702 THIRD AVE., MOLINE, ILLINOIS

through a variable speed range that may be as high as 5 to 320 inches per minute.

The welding boom, is designed to mount any standard automatic welding head and is powered for vertical adjustment up to 12 feet vessel diameter. It is retracted through a

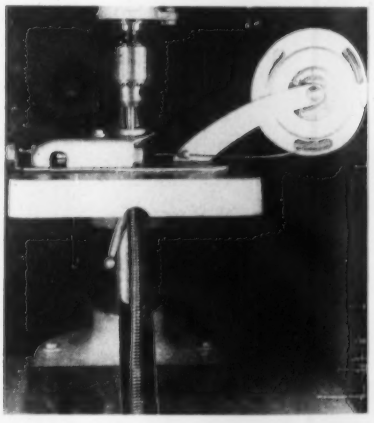


variable speed power source, permitting welding of 10 foot seams at right angles to the gantry track. Dual controls are provided so that all movements may be operated from the end of the welding boom or from the base of the gantry.

Check No. 10 on Reply Card for more Details

Shop Spring-Maker

An attachment that converts the ordinary tool shop drill press into an efficient spring-making machine is being manufactured by Cycloid Corp., 12 Newhall Ave., Saugus, Mass. Wire from 8 gage (0.020) to 28 gage



(0.071) can be used. Outside diameter of finished spring can be made to vary from 3/16 to 5/8-inch. Special dimensions can be made by special spindles.

Pitch of compression spring may be infinitely varied while machine is

3 Production Benefits from this Remarkable Instrument

1. Closer Combustion Control
2. Better Quality Control
3. Productivity Raised

The Cities Service Heat Prover Analyzes Combustion Atmospheres of Industrial Furnaces

Regardless of type or size of furnace, atmospheres vital to steel production are quickly, accurately and completely analyzed. With this one remarkable instrument it is easy to determine how much fuel is wasted, whether excess oxygen may be present to cause scaling and how much energy is wasted in uselessly heating excess air.

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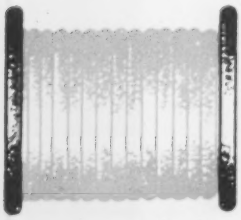
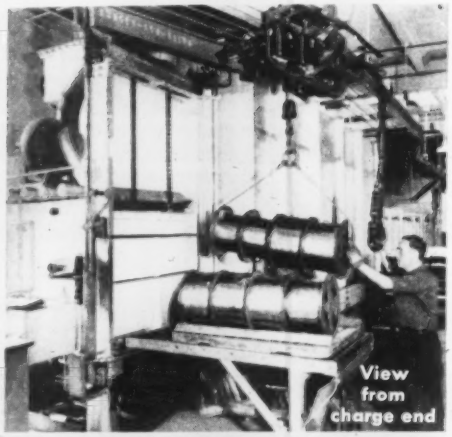


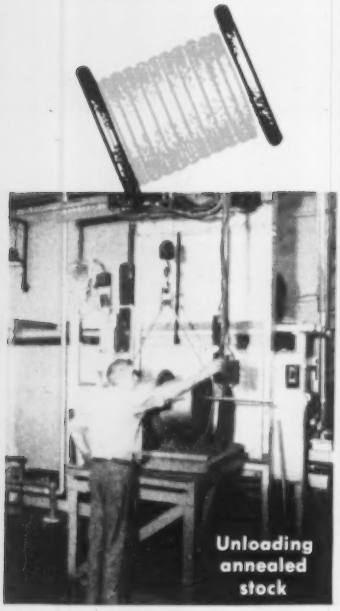
Bright Annealing of Copper



HOLCROFT'S HIGH-PRODUCTION FURNACE MINIMIZES OXIDATION

Typical of Holcroft trail-blazing in furnace engineering, this high-production gas-atmosphere unit handles bright annealing of wire, strip and bar stock of copper and non-ferrous copper alloys. Note these special features:

- Except for loading and unloading, operation is fully automatic. Coiled stock is loaded on trays as shown. Bar stock can be annealed simultaneously in bank of six tubes at top of furnace. Production is 4000 lbs. per hour.
- Special Holcroft gas generator under automatic control provides inert protective atmosphere surrounding work in process. Gas is free of sulfur and oxygen, with negligible hydrogen and CO content. Gas-tight furnace and vestibules plus automatic flushing further assure uncontaminated work.
- Heating is by Holcroft electric elements, quickly replaceable without shutting down furnace. Gas-fired radiant tubes can be used where more economical. Heating zone is held at any desired temperature from 500° to 1150° F. Annealing zone is water-cooled.
- These, plus other Holcroft features, assure maximum economy and quality of work, as proven by four years of continuous operation at Canada Wire and Cable Company. These same production advantages are found in Holcroft furnaces for every heat treat requirement; for each Holcroft furnace is individually designed for its specific application and is backed by complete metallurgical and engineering service.



We cordially invite your inquiries.

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SINCE 1916 *Holcroft* AND COMPANY

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PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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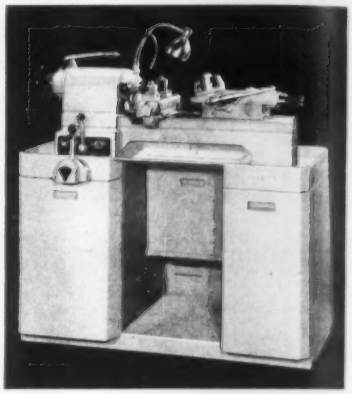
4209 South Western Blvd.	1900 Euclid Avenue	5724 Navigation Blvd.	Windsor, Ontario	Paris 8, France

running. Length of spring to be made is governed only by the length of the wire. One bolt fastens the device to drill press, spindle is inserted in chuck and drill press is ready to produce springs.

Check No. 11 on Reply Card for more Details

Cuts Machining Time

Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass., offers a 9-inch swing machine for production of small duplicate parts to interchangeable limits. Cutting speeds from 90 to 3750 rpm are available. Machine features an automatic chuck closer. Collets have doubled bearing space for



greater gripping power. Draw-in collet capacity is 1⅛ inches on long taper key-drive spindle nose.

Capacity of the stationary collet is ⅞-inch and closing action is accomplished without lateral movement in the spindle preventing scarring of stock. Self-aligning slide rest automatically squares itself with line of center.

Check No. 12 on Reply Card for more Details

Wide Range of Pressures

Airoymetric pressure generator made by Milton Roy Co., 1302 E. Mermaid Lane, Philadelphia 18, Pa., is combined with a group of specially designed simplified controls to develop pressures up to 25,000 psi, using ordinary plant air supply in the pump cylinder. The pumps develop a discharge pressure ratio range of at least 6 to 1 permitting single pump use for applications requiring various test pressures. Individual units may be custom made for specific applications between 25 psi and 25,000 psi.

Pressure generator has use in the hydrostatic testing of boilers, forgings, castings, tubing, pipes and piping systems, etc. It is used for filling refrigerants and other liquefied gases into bottles or containers. Ca-

the magnet that answers THE NEED

Dings New Improved Lifting Magnet . . . Weighs Less, Lifts More, and Lasts Longer

THIS latest Dings magnet has *all* the features necessary for maximum scrap yard performance. A few examples . . .

WELDED STEEL CONSTRUCTION—eliminates the moisture danger, makes a strong rigid magnet that can take the hard blows.

LIGHTER WEIGHT—*More* of the weight your crane is carrying will be payload. A balanced magnetic circuit of advanced design makes this difference.

MAXIMUM POWER, LONGER—No. 1 reason for this is less heat rise due to the improved magnetic circuit. In addition, a new, finer insulating compound dissipates strength-sapping heat, prevents electrical leakage between coil wires.

Those are the *big* new features. There are a dozen other important ones you'll be interested in.

FOR FULL DETAILS, WRITE for the LIFTING MAGNET CATALOG.

DINGS MAGNETIC SEPARATOR CO.

4710 W. Electric Ave., Milwaukee 46, Wis.

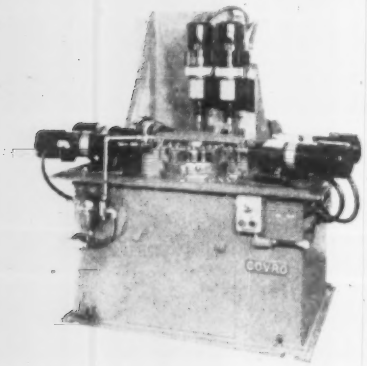
Dings Certified MAGNETIC STRENGTH

pacities range from 4 gph to 405 gph, pressures from 25 psi to 25,000 psi with ordinary plant air supply.

Check No. 13 on Reply Card for more Details

Drilling Time Cut

Govro-Nelson Co., 1933 Antoinette St., Detroit 8, Mich., announces a machine designed to drill, ream, countersink and tap a small part automatically. Production speeds on a small brass part requiring eight operations range up to 1200 pieces per hour. The setup employs seven auto-



matic drilling units and one automatic tapping unit which are electrically interlocked to operate from an indexing dial.

Part is clamped, machined, unclamped and ejected automatically and chips are blown off the machine. Machine may be operated semiautomatically or automatically by use of a selector switch.

Check No. 14 on Reply Card for more Details

Two Heavy Duty Drills

Two new heavy duty drills are available from Cummins Portable Tools, division of Cummins-Chicago Corp., Chicago 40, Ill. Model 427 is for drilling tough metals and has a capacity of ¼-inch in metal, ¾-inch in hard wood; no load speed, 1750 rpm; Jacobs model 7G geared chuck; length 12¼ inches. Model 230, for fast drilling in all metals, has a capacity of ⅜-inch in metal, 1-inch in hard wood; no load speed 750 rpm; Jacobs geared chuck model 32B; length 13½ inches.

Check No. 15 on Reply Card for more Details

Self-Contained Tapping Head

Driving and reversing gears of the new self-contained auto reverse adjustable tapping head made by Errington Mechanical Laboratory Inc., Staten Island 4, N. Y., are built right into the head. Head is completely sealed in cast aluminum case with Alemite fittings for pressure lubrication. Units are available in ¼ and ½-inch tap capacity.

Check No. 16 on Reply Card for more Details

Counteracts Galling, Seizing

Molykote type G, available from Alpha Corp., Greenwich, Conn., has as its basic lubricity ingredient a specially prepared and highly purified molybdenum disulphide compound which has a phenomenal capacity to prevent metal-to-metal contact, and thereby counteracts galling and seizing at extreme bearing pressures.

Check No. 17 on Reply Card for more Details

Adjustable Tool Holder

An adjustable tool holder, introduced by Robert H. Clark Co., Beverly Hills, Calif., features a vise grip jaw that exerts equal pressure over the full length of the cutter channel. This eliminates any tendency of the tool bit to rock. Holders are available in standard 15 degree channels and with parallel channels for carbide bits, threading tools and boring bars.

Check No. 18 on Reply Card for more Details

Leaves Iron Phosphate Coating

A new wipe-off metal cleaner, made by Westville Laboratories, Monroe, Conn., not only removes rust, grease and oil, but also leaves an iron phosphate coating which is a firm bond for all types of paint. Known as Metal-Redi, it is applied with a brush or steel wool, may be scrubbed if necessary, and is wiped off with a cloth. After allowing surface to dry 5 or 10 minutes, it may be painted.

Check No. 19 on Reply Card for more Details

Lift Larger Loads Safely

Robert H. Froom & Co., Los Angeles 47, Calif., offers an eye bolt that pivots, permitting weight to center. Made of high grade steel, it is ductile and tough, providing safety factors under strains and jerks. Standard models are available in bolt sizes of ½, ⅝, ¾, ⅞, and 1-inch, USS threads.

Check No. 20 on Reply Card for more Details

Timer Has Invertible Magnet

Designed for timing machine tool cycles, conveyor systems and similar industrial operations, class 9050 type R pneumatic timing relay has a new invertible magnet. The magnet permits easy conversion from delay after energizing operation to delay after de-energizing, or vice versa. No extra parts are needed to convert. Timing range is adjustable from 0.2 second to 3 minutes. It is available from Square D Co., Milwaukee 12, Wis., in NEMA I, IV and VII enclosures.

Check No. 21 on Reply Card for more Details

Nut Has Double Lock

A one-piece double action spring lock nut that provides 360-degree grip into the root of the screw is available from Prestole Corp., Toledo, O. It is a sheet metal nut with a double lock. Known as Hex Lox nut, it is made of SAE-1060 steel, in thicknesses of 0.016 and 0.020-inch in the following sizes—6-32, 8-32, 10-32, 10-24 and ¼-20.

Check No. 22 on Reply Card for more Details

Coating Resists Alkalies

Alkaloy 550, developed by Atlas Mineral Products Co., Mertztown, Pa., is a coating that is resistant to all alkalies, solvents, salts and most acids. It is available as a high solids liquid which is converted at time of use to a jet black resilient solid.

Check No. 23 on Reply Card for more Details

Sees All Types of Flames

Series FP controls, made by Combustion Control Corp., Cambridge 42, Mass., see all types of flames. The scanner of this photoelectric flame failure safeguard is the Firetron tube, a new photoconductive cell which sees all flames and gives instantaneous and positive response to flame failure.

Check No. 24 on Reply Card for more Details

Multistation Thermocouple Gag

A vacuum gage in multistation form for coaters, dehydrators, vacuum furnaces and other industrial high vacuum equipment is announced by Distillation Products Industries, division of Eastman Kodak Co., Rochester 4, N. Y. Known as the thermocouple gage, type TG-09, it is available with two, three, four, five or six stations, all reading on a single meter. Range covered is from a few microns to one millimeter Hg.

Check No. 25 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

75. Speed Reducers

Farrel-Birmingham Co.—44-page illustrated bulletin No. 449 contains descriptions of single and double-reduction type speed reducers, horsepower rating tables, overhung load capacities, dimensions and weights. Directions for selection of proper unit are given.

76. Inclinable Punch Presses

L. & J. Press Corp.—4-page illustrated condensed catalog presents details of twelve models of open back inclinable pressures ranging in size from 6 to 80 tons, with four larger models also made in back geared types. Details specifications are listed on all machines.

77. Tapping Equipment

Hamilton Tool Co.—4-page illustrated bulletin T-47 "Hamilton Equipment for Production Tapping of Small Holes" outlines features, capacities, speeds, clearances, travel and mechanical and electrical characteristics of Super Sensitive tapping machines.

78. Load Cells

Baldwin-Lima-Hamilton Corp. — 2-page illustrated bulletin No. 324 is descriptive of seven type U-1 SR-4 universal load cells ranging in weighing capacity from 500 to 50,000 lb in tension and compression. Cells depend upon electrical resistance measurements of resistance wire strain gages bonded to steel column.

79. Metal Closures

Tubing Seal Cap Inc.—6-page illustrated folder lists types and sizes of stamped steel and aluminum seal caps and plugs available for keeping dirt, dust and moisture out of fluid lines under pressure. They can be hand-tightened to seal. Many are cadmium plated and can be reused.

80. Chrome Plating Unit

Ward Leonard Electric Co., Industrial Chrome Div.—4-page illustrated bulletin IC-20 describes model A-20 Chromaster industrial hard chrome plating unit which applies Chromasol plate in five steps: clean, determine area, strip, plate and rinse. Capacity is up to 10 sq in. at 2-amp current density.

81. Hydraulic Components

Vickers Inc. — 16-page illustrated catalog No. M-5100 "Vickers Hydraulics for Mobile Equipment" shows applications for and presents specifications of various types of hydraulic equipment, including pumps and controls, power pack, valves, hydraulic power steering and hydraulic motors.

82. Spray-Painting Equipment

DeVilbiss Co.—48-page illustrated catalog DI-B covers in condensed form complete spray-painting equipment for exterior and interior painting and automobile refinishing and equipment for automotive service as well as air and fluid hose.

83. Milling Attachment

Cincinnati Milling Machine Co. — 2-page illustrated data sheet M-1729 lists data on 12-in. circular milling attachment in manual and power feed types which can be used on standard milling machines. Units are designed for precision tool room and production work.

84. Materials Handling

Towmotor Corp.—8-page illustrated broadside "Towmotor-ize for Mass Handling" explains features of industrial power trucks which include heavy-duty clutch, two speeds forward and two speeds reverse, gasoline power for 24-hr service and center seat control. Various models of fork lift trucks in capacities from 1500 to 15,000 lb, 3000-4000-lb drawbar capacity tractor and 4000-lb capacity electric pallet truck are shown.

85. High Speed & Carbide Tools

Gorham Tool Co.—120-page illustrated looseleaf catalog and price list is entitled "Cutting Tools of Quality." Complete specifications and application data are included on plain, helical, side, staggered tooth, half-side, interlocking side and many other milling cutters; Woodruff keyseat cutters; slitting saws; tool bits; centers and other high speed steel and carbide cutting tools.

86. Tool Specialties

Vlier Mfg. Co.—8-page illustrated bulletin "Tool Specialties for All Industries" describes various types and sizes of spring plungers, torque thumb screws, fixture keys and spring stops. Typical uses of these tool specialties are shown.

87. Stamping Trimmer

Whiting Corp., Quickwork Div. — 20-page illustrated bulletin QW-123 deals with applications, operations and specifications of Quickwork-Whiting stamping trimmer. In addition to trimming flash from any stamping in single plane, machine can also handle beading and forming operations in same or separate passes.

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88. Electronic Paint Control

Ashdee Products, Inc.—4-page illustrated bulletin tells how Paint-Miser electronic accessory for paint spray equipment charges paint particles with negative electrical charge after they leave spray gun so that they are attracted to item to be coated which is at ground potential. Use of this accessory reduces handling costs, assures uniform coverage and increases efficiency.

89. Large Induction Motors

Westinghouse Electric Corp. — 28-page illustrated booklet B-4739 presents quick summary of two basic kinds of induction motors: type CSF squirrel-cage motors for constant-speed drive; and type CWF wound-rotor motors for adjustable-speed drive. Both types are available in wide variety of open drip-proof and special enclosures.

90. Precision Holding Tools

Erickson Steel Co., Erickson Tools Div.—Illustrated catalog J describes line of precision holding tools which includes collet chucks, adjustable and full-floating holders, tap chucks, air-operated speed chucks and air cylinders, expanding mandrels, speed indexers, and boring and reaming tools.

91. Shaft Straighteners

General Mfg. Co.—4-page illustrated bulletin 39C shows various types of attachments for power presses which permit production straightening of shafts, tubes, bars and assemblies. Centered and uncentered parts can be straightened.

92. Power Shear

Hobbs Mfg. Co.—4-page illustrated folder describes Jacques power shear for production cutting light metals, plastics, laminations and other materials in sheet or roll form. Semi and fully automatic models give versatility in both feed and receiving set-ups and type of control. Specifications of machine with maximum speed of 70 strokes per minute are included.

93. Tubing Steels

Babcock & Wilcox Tube Co.—6-page technical bulletin 12F contains condensed technical information for engineers associated with problems involving design, fabrication and use of tubing employed in elevated temperature and high pressure applications. Analyses, physical and mechanical properties, creep strength and other data on 14 popular Croloy tubing steels are presented.

94. Vibration Isolation

Felters Co. — 16-page illustrated booklet "Unisorb" describes how this material simplifies anchoring of machines on all types of floors and controls transmitted vibration and noise. Use of cemented pads for mounting textile, air conditioning and other machines; compressors and pumps; machine tools and many other types of equipment are described.

95. Heat Resisting Paints

Skybryte Co. — 4-page illustrated folder presents salient features of two Skyco heat resisting aluminum paints. Interior paint will withstand 1000° F temperatures, while exterior finish withstands 550° F. Acid and alkali resisting aluminum paint and Fence-Bond aluminum paint for rusted chain-link fences are also covered.

96. Floor Machines

G. H. Tennant Co.—1-page illustrated bulletin 81.61 is descriptive of industrial floor machines in 8, 12 and 16-in. sizes which are self-propelled and gasoline engine or electric powered. Also covered is heavy duty power sweeper which cleans up to 54,000 sq ft of floor space per hour and incorporates brush and vacuum system.

97. Control Instrument

Industrial Electronics, Inc.—2-page illustrated bulletin T-144-B offers factual data and specifications on Dyna-Meter model 144 for control of processing machinery, visual indication of transient phenomena, automatic gaging and sorting and other functions. It is indicating instrument operating from output of Dyna-Myke instruments.

98. Squirrel-Cage Motors

Wagner Electric Corp.—4-page illustrated bulletin MU-132 explains features of totally-enclosed fan-cooled polyphase squirrel-cage motors in ratings from 2 to 250 hp. Cast iron construction affords protection against corrosion.

99. Laboratory Apparatus

Fisher Scientific Co.—6-page illustrated folder lists 37 new items including scientific instruments, laboratory apparatus and safety devices which have been developed and introduced during past two years.

100. Enamel Finish Paint

Chamberlain Engineering Corp. — 4-page illustrated bulletin No. 239 describes advantages in using Neolac 600 enamel finish paint. It contains no lead but is made with C-34 resin that gives fast drying, hard finish, high gloss and ample weather ability.

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9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 5-7-51

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The Market Outlook

AVAILABILITY of steel for the general consuming market after the Controlled Materials Plan becomes effective July 1 presents the burning question of the moment. How much "free" steel will be left over after defense and defense-support requirements are satisfied?

REQUIREMENTS—Estimates for May placed defense and supporting needs around 45 per cent of production, leaving 55 per cent for the civilian economy. Allotments on emergency account are upped somewhat for June, and expectations are they will be further increased for succeeding months. Consequently, authoritative answer as to civilian supplies after July 1 awaits government contractors' reports to steel control authorities detailing their requirements. Upon receipt of these data stated needs will be balanced against production, and allotments made with an eye to their impact on the civilian economy.

PLANNING—Operation of CMP is expected to be disclosed in greater detail to steel producers and consumers shortly, thus removing some of the uncertainties in the markets. It may take several weeks for defense allotment policies to be thoroughly worked out. Meanwhile, steelmakers and their customers must make their own plans for the immediate future more or less in the dark. Right now the producers face the problem of scheduling unrated tonnage for July, the usual 45-day lead time for that month expiring about May 15.

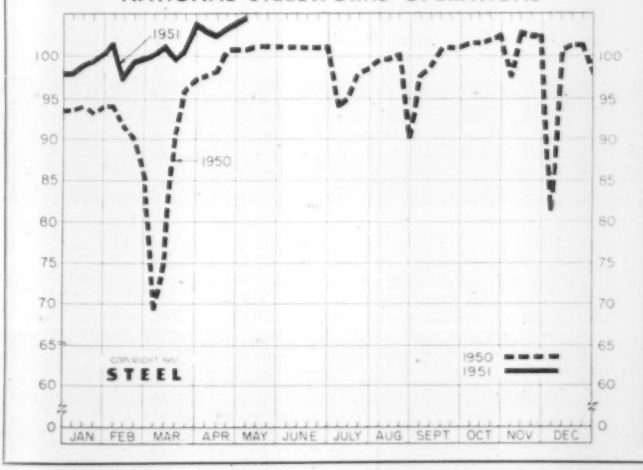
SUPPLY—Expectations are that leftover tonnage after defense and supporting needs are met will fall far short of civilian demands despite curtailments in consumer hard goods manufacture. Some of the recent slackening in consumer durables because of excessive stocks at the wholesale level is believed temporary, and pressure for steel on civilian account is likely to continue unabated. So far no easing in civilian demand pressure is noted, cutbacks in production schedules to date stemming largely from mandatory reductions in steel quotas to civilian end-uses beginning this quarter. Further slash in civilian steel quotas is scheduled for third quarter, and suggestions now are being made that limitations be placed on the number of units individual manufacturers can turn out.

PRODUCTION—The steel mills are pushing production at above-capacity pace. Last week the national ingot rate went up another ½ point to 104 per cent. This is a new all-time high, output for the week totaling about 2,079,000 net tons. It marks the ninth consecutive weekly output in excess of 2 million tons.

RAW MATERIALS—Concern is growing over raw materials supply to support capacity steelmaking indefinitely into the future. Also, question is arising as to how long equipment can be pushed to the limit without shutdowns for repairs. Iron ore is flowing from upper lake ports in heavy volume for this early in the season. Cumulative season total to May 1 is 6,211,474 tons compared with only 348,804 tons at this time last year. No shortage of ore now is anticipated. Serious scarcity of steelmaking scrap threatens, however, and efforts are being made to stimulate collections through voluntary drives throughout industry. The foundries are having increasing difficulty maintaining melting schedules in the face of growing pig iron, scrap, coke and ferroalloy shortages. The situation in pig iron appears increasingly acute at some points with supplies of imported iron threatening to dry up.

PRICES—All steel product and related price schedules are firmly stabilized at levels prevailing in January at the time of the government freeze order. STEEL's weighted index on finished steel holds at 171.92 as does the arithmetical average at $106.32. Pig iron composites are unchanged with No. 2 foundry, $52.54; basic, $52.16; and malleable, $53.27. Steelmaking scrap composite is steady at $44 and compares with $30.92 a year ago.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended May 5	Change	Same Week 1950	Same Week 1949
Pittsburgh	102.5	0*	100.5	96
Chicago	109	+1	105	100
Mid-Atlantic	101	0	97	93
Youngstown	104	0	107	105
Wheeling	97.5	0	102.5	91.5
Cleveland	100.5	+0.5	96	98
Buffalo	104	0	104	101.5
Birmingham	100	0	100	100
New England	98	+8	88	62
Cincinnati	102	—3	103	103
St. Louis	92.5	—4.5	82	75.5
Detroit	106	—3*	102	108
Western	104	—3	93	92
Estimated national rate	104	+0.5	100.5	97

Based on weekly steelmaking capacity of 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

* Change from revised rate for preceding week.

The Metalworking Outlook—p. 79 Production-Engineering News—p. 115

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Composite Market Averages

	May 3 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av. 100)	171.92	171.92	171.92	156.13	111.62
Index, in cents per lb.	4.657	4.657	4.657	4.230	3.024
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$93.23	63.54
No. 2 Fdry, Pig Iron, GT	52.54	52.54	52.54	46.47	26.17
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	25.50
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.79
Steelmaking Scrap, GT	44.00	44.00	44.00	30.92	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	May 3 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bars, H.R., del. Philadelphia	4.20	4.20	4.20	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10-15	3.10
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia	3.91	3.91	3.91	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.50
Sheets, H.R., Pittsburgh	3.60-75	3.60-75	3.60-75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh	3.75-4.00	3.75-4.00	3.75-4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.35-5.60	4.35-5.60	4.35-5.60	4.35-40	3.15
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.50	3.05
Nails, Wire, Pittsburgh	5.90-6.20	5.90-6.20	5.90-6.20	5.30	3.25
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, ⅜-⅝", Pitts.	4.10-30	4.10-30	4.10-30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$27.00
Basic Valley	52.00	52.00	52.00	46.00	26.00
Basic, del. Phila.	56.49	56.49	56.49	49.44	27.84
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Del. Phila.	56.99	56.99	56.99	49.94	28.34
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	22.88
No. 2 Fdry (Birm.) del. Cin.	55.33	55.33	55.33	49.08	26.94
Malleable Valley	52.50	52.50	52.50	46.50	26.50
Malleable, Chicago	52.50	52.50	52.50	46.50	26.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pitts.	$45.00	$45.00	$45.00	$35.00	$20.00
No. 1 Heavy Melt, E. Pa.	43.50	43.50	43.50	27.25	18.75
No. 1 Heavy Melt, Chicago	43.50	43.50	43.50	30.50	18.75
No. 1 Heavy Melt, Valley	45.00	45.00	45.00	34.75	20.00
No. 1 Heavy Melt, Cleve.	44.00	44.00	44.00	31.25	19.50
No. 1 Heavy Melt, Buffalo	44.00	44.00	44.00	29.75	19.25
Rails, Rerolling, Chicago	52.50	52.50	52.50	47.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	42.50	20.00

* F.o.b. shipping point.

COKE, Net Ton

Beehive, Furn., Connlsvl.	$14.75	$14.75	$14.75	$14.25	$7.50
Beehive, Fdry., Connlsvl.	17.50	17.50	17.50	16.00	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	19.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	11.00	8.25
Lead, St. Louis	16.80	16.80	16.80	11.05	6.35
Tin, New York	142.00	142.00	149.875	77.00	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid	50.50	50.50	50.50	40.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa. - B2	$54.00	$54.50	$55.00	$56.00
Brooklyn, N.Y., del.	....	58.69	59.46	....
Newark, del.	56.74	57.24	57.74	58.24
Philadelphia, del.	56.49	56.99	57.49	57.99
Birmingham District				
Alabama City, Ala., R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala. W15	48.38*	48.88	....	....
Cincinnati, del.	....	55.33	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y. W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y. T9	....	52.50	53.00	....
Boston, del.	61.63	62.13	62.63	....
Rochester, N.Y., del.	54.74	55.24	55.74	....
Syracuse, N.Y., del.	56.72	56.22	56.72	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
Indiana Harbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill. Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	53.97	54.47	54.47	54.97
Muskegon, Mich., del.	....	58.20	58.20	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.49	54.99	54.99	55.49
Lorain, O. N3	52.00	....	....	53.50
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	51.75	52.25	....
Fontana, Calif. K1	58.00	58.50	....	....
Geneva, Utah G1	52.00	52.50	....	....
Seattle, Tacoma, Wash. del.	....	60.35	....	....
Portland, Oreg., del.	....	60.35	....	....
Los Angeles, San Francisco, del.	59.85	60.35	....	....
Granite City, Ill. G4	53.90	54.40	54.90	....
St. Louis, del. (inc. tax)	54.66	55.16	55.66	....
Ironton, Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
Neville Island, Pa. P6	....	52.50	52.50	53.00
Pitts., N.&S. sides, Ambridge, Aliquippa, del.	....	53.74	53.74	54.24
McKees Rocks, del.	....	53.49	53.49	53.99
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	54.00	54.00	54.50
Verona, del.	....	54.48	54.48	54.98
Brackenridge, del.	....	54.72	54.72	55.22
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	....	....
Sharpsville, Pa. S6	....	....	52.50	53.00
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.21	57.71	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.43	56.93	56.93	57.43

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SIVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson, O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

Niagara Falls, N.Y. P15	$83.00
Keokuk, Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 x 6)

Lyles, Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia delivered	63.12
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, May 3, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicat e producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana, Calif. K1 ... $79.00
Munhall, Pa. U5 ... 52.00

INGOTS, Alloy (NT)
Detroit R7 ... $54.00
Fontana, Calif. K1 ... 80.00
Houston, Tex. S5 ... 62.00
Midland, Pa. C18 ... 54.00
Munhall, Pa. U5 ... 54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer, Pa. U5 ... $56.00
Clairton, Pa. U5 ... 56.00
Ensley, Ala. T2 ... 56.00
Fairfield, Ala. T2 ... 56.00
Fontana, Calif. K1 ... 75.00
Gary, Ind. U5 ... 56.00
Johnstown, Pa. B2 ... 56.00
Lackawanna, N.Y. B2 ... 56.00
Munhall, Pa. U5 ... 56.00
So. Chicago, Ill. U5 ... 56.00
So. Duquesne, Pa. U5 ... 56.00

Carbon, Forging (NT)
Bessemer, Pa. U5 ... $66.00
Buffalo R2 ... 66.00
Canton, O. R2 ... 66.00
Clairton, Pa. U5 ... 66.00
Cleveland R2 ... 66.00
Conshohocken, Pa. A3 ... 73.00
Detroit R7 ... 69.00
Ensley, Ala. T2 ... 66.00
Fairfield, Ala. T2 ... 66.00
Fontana, Calif. K1 ... 85.00
Gary, Ind. U5 ... 66.00
Geneva, Utah G1 ... 66.00
Houston, Tex. S5 ... 74.00
Johnstown, Pa. B2 ... 66.00
Lackawanna, N.Y. B2 ... 66.00
Los Angeles B3 ... 85.00
Munhall, Pa. U5 ... 66.00
Seattle B3 ... 85.00
So. Chicago R2, U5, W14 ... 66.00
So. Duquesne, Pa. U5 ... 66.00
So. San Francisco B3 ... 85.00

Alloy, Forging (NT)
Bethlehem, Pa. B2 ... $70.00
Buffalo R2 ... 70.00
Canton, O. R2 ... 70.00
Canton, O. (29) T7 ... 66.00
Conshohocken, Pa. A3 ... 77.00
Detroit R7 ... 73.00
Fontana, Calif. K1 ... 89.00
Gary, Ind. U5 ... 70.00
Houston, Tex. S5 ... 78.00
Ind. Harbor, Ind. Y1 ... 70.00
Johnstown, Pa. B2 ... 70.00
Lackawanna, N.Y. B2 ... 70.00
Los Angeles B3 ... 90.00
Massillon, O. R2 ... 70.00
Midland, Pa. C18 ... 70.00
Munhall, Pa. U5 ... 70.00
So. Chicago R2, U5, W14 ... 70.00
So. Duquesne, Pa. U5 ... 70.00
Struthers, O. Y1 ... 70.00
Warren, O. C17 ... 70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton, O. R2 ... $82.00
Cleveland R2 ... 82.00
Fontana, Calif. K1 ... 103.00
Gary, Ind. U5 ... 82.00
Massillon, O. R2 ... 82.00
So. Chicago, Ill. R2 ... 82.00
So. Duquesne, Pa. U5 ... 82.00

SHEET BARS (NT)
Fontana, Calif. K1 ... $89.00

SKELP
Aliquippa, Pa. J5 ... 3.45
Munhall, Pa. U5 ... 3.35
Warren, O. R2 ... 3.35
Youngstown R2, U5 ... 3.35

WIRE RODS
AlabamaCity, Ala. R2 ... 4.10
Buffalo W12 ... 4.10
Cleveland A7 ... 4.10
Donora, Pa. A7 ... 4.10
Fairfield, Ala. T2 ... 4.10
Fontana, Calif. K1 ... 4.90
Houston, Tex. S5 ... 4.50
Johnstown, Pa. B2 ... 4.10
Joliet, Ill. A7 ... 4.10
Los Angeles B3 ... 4.90
Minnequa, Colo. C10 ... 4.35
Monessen, Pa. P7 ... 4.30
No. Tonawanda, N.Y. B11 ... 4.10
Pittsburg, Calif. C11 ... 4.75
Portsmouth, O. P12 ... 4.30
Roebling, N.J. R5 ... 4.20
So. Chicago, Ill. R2 ... 4.10
SparrowsPoint, Md. B2 ... 4.20
Sterling, Ill. (1) N15 ... 4.10
Struthers, O. Y1 ... 4.10
Torrance, Calif. C11 ... 4.90
Worcester A7 ... 4.40

PLATES, Wrought Iron
Economy, Pa. B14 ... 8.60

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity, Ala. R2 ... 3.60
Aliquippa, Pa. J5 ... 3.65
Bessemer, Ala. T2 ... 3.65
Bethlehem, Pa. B2 ... 3.70
Clairton, Pa. U5 ... 3.65
Fairfield, Ala. T2 ... 3.65
Fontana, Calif. K1 ... 4.25
Gary, Ind. U5 ... 3.65
Geneva, Utah G1 ... 3.65
Houston, Tex. S5 ... 4.05
Ind. Harbor, Ind. I-2 ... 3.65
Johnstown, Pa. B2 ... 3.70
KansasCity, Mo. S5 ... 4.25
Lackawanna, N.Y. B2 ... 3.70
LosAngeles B3 ... 4.25
Minnequa, Colo. C10 ... 4.10
Munhall, Pa. U5 ... 3.65
Niles, Calif. (22) P1 ... 4.85
Phoenixville, Pa. P4 ... 4.95
Portland, Oreg. O4 ... 4.50
Seattle B3 ... 4.30
So. Chicago, Ill. U5, W14 ... 3.65
So. SanFrancisco B3 ... 4.20
Torrance, Calif. C11 ... 4.25
Weirton, W.Va. W6 ... 3.90

Alloy Stand. Shapes
Clairton, Pa. U5 ... 4.35
Fontana, Calif. K1 ... 5.55
Munhall, Pa. U5 ... 4.35
So. Chicago, Ill. U5 ... 4.35

H.S., L.A. Stand. Shapes
Aliquippa, Pa. J5 ... 5.50
Bessemer, Ala. T2 ... 5.50
Bethlehem, Pa. (14) B2 ... 5.50
Clairton, Pa. U5 ... 5.50
Fairfield, Ala. T2 ... 5.50
Fontana, Calif. K1 ... 6.10
Gary, Ind. U5 ... 5.50
Geneva, Utah G1 ... 5.50
Ind. Harbor, Ind. I-2 ... 5.50
Ind. Harbor, Ind. Y1 ... 6.00
Johnstown, Pa. B2 ... 5.50
Lackawanna, N.Y. (14) B2 ... 5.50
LosAngeles B3 ... 6.05
Munhall, Pa. U5 ... 5.50
Seattle B3 ... 6.10
So. Chicago, Ill. U5 ... 5.50
So. SanFrancisco B3 ... 6.00
Struthers, O. Y1 ... 6.00

Wide Flange
Bethlehem, Pa. B2 ... 3.70
Clairton, Pa. U5 ... 3.65
Fontana, Calif. K1 ... 4.65
Lackawanna, N.Y. B2 ... 3.70
Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

H.S., L.A. Wide Flange
Bethlehem, Pa. B2 ... 5.50
Lackawanna, N.Y. B2 ... 5.50
Munhall, Pa. U5 ... 5.45
So. Chicago, Ill. U5 ... 5.45

SHEET STEEL PILING
Ind. Harbor, Ind. I-2 ... 4.45
Lackawanna, N.Y. B2 ... 4.45
Munhall, Pa. U5 ... 4.45
So. Chicago, Ill. U5 ... 4.45

BEARING PILES
Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

PLATES, High-Strength Low-Alloy
Aliquippa, Pa. J5 ... 5.65
Bessemer, Ala. T2 ... 5.65
Clairton, Pa. U5 ... 5.65
Cleveland J5, R2 ... 5.65
Conshohocken, Pa. A3 ... 5.90
Fairfield, Ala. T2 ... 5.65
Fontana, Calif. (30) K1 ... 6.25
Gary, Ind. U5 ... 5.65
Geneva, Utah G1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.65
Ind. Harbor, Ind. Y1 ... 6.15
Johnstown, Pa. B2 ... 5.65
Munhall, Pa. U5 ... 5.65
Pittsburgh J5 ... 5.65
Seattle B3 ... 6.55
Sharon, Pa. S3 ... 5.70
So. Chicago, Ill. U5 ... 5.65
SparrowsPoint, Md. B2 ... 5.65
Warren, O. R2 ... 5.65
Youngstown Y1 ... 6.15

PLATES, Open-Hearth Alloy
Claymont, Del. C22 ... 4.85
Coatesville, Pa. L7 ... 5.25
Conshohocken, Pa. A3 ... 5.05
Fontana, Calif. K1 ... 5.70
Gary, Ind. U5 ... 4.75
Johnstown, Pa. B2 ... 4.75
Munhall, Pa. U5 ... 4.75
Sharon, Pa. S3 ... 5.20
So. Chicago, Ill. U5 ... 4.75
SparrowsPoint, Md. B2 ... 4.75

FLOOR PLATES
Cleveland J5 ... 4.75
Conshohocken, Pa. A3 ... 4.75
Harrisburg, Pa. C5 ... 5.95
Ind. Harbor, Ind. I-2 ... 4.75
Munhall, Pa. U5 ... 4.75
So. Chicago, Ill. U5 ... 4.75

PLATES, Carbon Steel
AlabamaCity, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Ashland, Ky. (15) A10 ... 3.70
Bessemer, Ala. T2 ... 3.70
Clairton, Pa. U5 ... 3.70
Claymont, Del. C22 ... 4.15
Cleveland J5, R2 ... 3.70
Coatesville, Pa. L7 ... 4.15
Conshohocken, Pa. A3 ... 4.15
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. (30) K1 ... 4.30
Gary, Ind. U5 ... 3.70
GraniteCity, Ill. G4 ... 4.40
Geneva, Utah G1 ... 3.70
Harrisburg, Pa. C5 ... 4.95
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Minnequa, Colo. C10 ... 4.50
Munhall, Pa. U5 ... 3.70
Pittsburgh J5 ... 3.70
Seattle B3 ... 4.60
Sharon, Pa. S3 ... 3.95
So. Chicago, Ill. U5, W14 ... 3.70
SparrowsPoint, Md. B2 ... 3.70
Steubenville, O. W10 ... 3.70
Warren, O. R2 ... 3.70
Weirton, W.Va. W6 ... 4.00
Youngstown R2, U5, Y1 ... 3.70

PLATES, Carbon A. R.
Fontana, Calif. K1 ... 5.45
Geneva, Utah G1 ... 4.85

PLATES, Ingot Iron
Ashland, c.l. (15) A10 ... 3.95
Ashland, l.c.l. (15) A10 ... 4.45
Cleveland, c.l. R2 ... 4.30
Warren, O. c.l. R2 ... 4.30

BARS, Hot-Rolled Carbon
AlabamaCity, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Alton, Ill. (1) L1 ... 3.95
Atlanta, Ga. A11 ... 4.25
Bessemer, Ala. T2 ... 3.70
Buffalo R2 ... 3.70
Canton, O. R2 ... 3.70
Clairton, Pa. U5 ... 3.70
Cleveland R2 ... 3.70
Detroit R7 ... 3.85
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
KansasCity, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
LosAngeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.15
Niles, Calif. P1 ... 5.05
N. Tonawanda, N.Y. B11 ... 3.70
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland, Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So. Chicago R2, U5, W14 ... 3.70
So. Duquesne, Pa. U5 ... 3.70
So. SanFran., Cal. B3 ... 4.45
Struthers, O. Y1 ... 3.70
Torrance, Calif. C11 ... 4.40
Weirton, W. Va. W6 ... 3.85
Youngstown R2, U5 ... 3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa, Pa. J5 ... 3.70
Atlanta A11 ... 4.25
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Niles, Calif. P1 ... 5.05
Portland, Oreg. O4 ... 4.65
SanFrancisco S7 ... 4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem, Pa. B2 ... 3.90

BARS, Hot-Rolled Alloy
Bethlehem, Pa. B2 ... 4.30
Buffalo R2 ... 4.30
Canton, O. R2 ... 4.30
Canton, O. (29) T7 ... 3.95
Clairton, Pa. U5 ... 4.30
Detroit R7 ... 4.45
Ecorse, Mich. G5 ... 4.65
Fontana, Calif. K1 ... 5.35
Gary, Ind. U5 ... 4.30
Houston, Tex. S5 ... 4.70
Ind. Harbor, Ind. I-2, Y1 ... 4.30
Johnstown, Pa. B2 ... 4.30
KansasCity, Mo. S5 ... 4.90
Lackawanna, N.Y. B2 ... 4.30
LosAngeles B3 ... 5.35
Massillon, O. R2 ... 4.30
Midland, Pa. C18 ... 4.30
So. Chicago R2, U5, W14 ... 4.30
So. Duquesne, Pa. U5 ... 4.30
Struthers, O. Y1 ... 4.30
Warren, O. C17 ... 4.30
Youngstown U5 ... 4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton, Pa. U5 ... 4.55
Gary, Ind. U5 ... 4.55
Youngstown U5 ... 4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa, Pa. J5 ... 5.55
Bessemer, Ala. T2 ... 5.55
Bethlehem, Pa. B2 ... 5.55
Clairton, Pa. U5 ... 5.55
Cleveland R2 ... 5.55
Fairfield, Ala. T2 ... 5.55
Fontana, Calif. K1 ... 6.60
Gary, Ind. U5 ... 5.55
Ind. Harbor, Ind. I-2 ... 5.55
IndianaHarbor, Ind. Y1 ... 6.05
Johnstown, Pa. B2 ... 5.55
Lackawanna, N.Y. B2 ... 5.55
LosAngeles B3 ... 6.25
Pittsburgh J5 ... 5.55
Seattle B3 ... 6.30
So. Duquesne, Pa. U5 ... 5.55
So. SanFrancisco B3 ... 6.30
Struthers, O. Y1 ... 6.05
Youngstown U5 ... 5.55

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ... 4.55
BeaverFalls, Pa. M12, R2 ... 4.55
Buffalo B5 ... 4.60
Camden, N.J. P13 ... 5.00
Carnegie, Pa. C12 ... 4.55
Chicago W18 ... 4.55
Cleveland A7, C20 ... 4.55
Detroit P17 ... 4.70
Donora, Pa. A7 ... 4.55
Elyria, O. W8 ... 4.55
FranklinPark, Ill. N5 ... 4.55
Gary, Ind. R2 ... 4.55
GreenBay, Wis. F7 ... 4.55
Hammond, Ind. L2, M13 ... 4.55
Hartford, Conn. R2 ... 5.10
Harvey, Ill. B5 ... 4.55
LosAngeles R2 ... 6.00
Mansfield, Mass. B5 ... 5.10
Massillon, O. R2, R8 ... 4.55
Monaca, Pa. S17 ... 4.55
Newark, N.J. W18 ... 5.00
Plymouth, Mich. P5 ... 4.80
Pittsburgh J5 ... 4.55
Putnam, Conn. W18 ... 5.10
Readville, Mass. C14 ... 5.10
St. Louis, Mo. M5 ... 4.95
So. Chicago, Ill. W14 ... 4.55
SpringCity, Pa. (5) K3 ... 5.00
Struthers, O. Y1 ... 4.55
Waukegan, Ill. A7 ... 4.55
Youngstown F3, Y1 ... 4.55

BARS, Cold-Finished Alloy
Ambridge, Pa. W18 ... 5.40
BeaverFalls, Pa. M12 ... 5.40
Bethlehem, Pa. B2 ... 5.40
Buffalo B5 ... 5.40
Camden, N.J. P13 ... 5.80
Canton, O. R2 ... 5.40
Canton, O. (29) T7 ... 4.90
Carnegie, Pa. C12 ... 5.40
Chicago W18 ... 5.40
Cleveland A7 ... 5.45
Cleveland C20 ... 5.40
Detroit P17 ... 5.55
Donora, Pa. A7 ... 5.45
Elyria, O. W8 ... 5.40
Gary, Ind. R2 ... 5.40
Hammond, Ind. L2, M13 ... 5.40
Hartford, Conn. R2 ... 5.85
Harvey, Ill. B5 ... 5.40
Lackawanna, N.Y. B2 ... 5.40
Mansfield, Mass. B5 ... 5.85
Massillon, O. R2, R8 ... 5.40
Midland, Pa. C18 ... 5.40
Monaca, Pa. S17 ... 5.40
Newark, N.J. W18 ... 5.75
Plymouth, Mich. P5 ... 5.60
So. Chicago, Ill. R2, W14 ... 5.40
Struthers, O. Y1 ... 5.40
Warren, O. C17 ... 5.40
Waukegan, Ill. A7 ... 5.45
Worcester, Mass. A7 ... 5.75
Youngstown F3, Y1 ... 5.40

RAIL STEEL BARS
ChicagoHts. (3,4) I-2, C2 ... 4.75
Franklin, Pa. (3, 4) F5 ... 4.75
FortWorth, Tex. (26) T4 ... 4.85
Huntingtn, W.Va. (3) W7 ... 5.50
Marion, O. (3) P11 ... 4.75
Moline, Ill. (3) R2 ... 3.80
Tonawanda (3,4) B12 ... 4.75
Williamsport (3) S19 ... 5.00
Williamsport (4) S19 ... 5.10

BARS, Wrought Iron
Dover, N.J. (Staybolt) U1 ... 15.00
Dover, (Eng. Bolt) U1 ... 13.50
Dover (Wrgt. Iron) U1 ... 12.25
Economy, Pa. (S.R.) B14 ... 9.60
Economy, Pa. (D.R.) B14 ... 11.90
Economy, (Staybolt) B14 ... 12.20
McK. Rks. (Staybolt) L5 ... 14.50
McK. Rks. (S.R.) L5 ... 9.60
McK. Rks. (D.R.) L5 ... 13.00

BARS, Reinforcing (Fabricators)
AlabamaCity, Ala. R2 ... 3.70
Alton, Ill. (6) L1 ... 3.70
Atlanta A11 ... 4.25
Buffalo R2 ... 3.70
Cleveland R2 ... 3.70
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
KansasCity, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
LosAngeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.50
Niles, Calif. P1 ... 5.05
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland, Oreg. O4 ... 4.65
SandSprings, Okla. S5 ... 4.60
Seattle B3, N14 ... 4.45
So. Chicago, Ill. R2 ... 3.70
So. Duquesne, Pa. U5 ... 3.70
So. SanFrancisco B3 ... 4.45
SparrowsPoint, Md. B2 ... 3.70
Struthers, O. Y1 ... 3.70
Torrance, Calif. C11 ... 4.40
Youngstown R2, U5 ... 3.70

BARS, Reinforcing (Fabricated; to Consumers)
Huntington, W.Va. W7 ... 5.50
Johnstown, ¾-1" B2 ... 4.75
LosAngeles B3 ... 5.45
Marion, O. P11 ... 5.00
Seattle B3, N14 ... 5.55
So. SanFrancisco B3 ... 5.45
SparrowsPt., ¾-1" B2 ... 4.75
Williamsport, Pa. S19 ... 5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity, Ala. R2 ... 3.60
Ashland, Ky. (8) A10 ... 3.60
Butler, Pa. A10 ... 3.60
Cleveland J5, R2 ... 3.60
Conshohocken, Pa. A3 ... 4.00
Detroit M1 ... 4.40
Ecorse, Mich. (8) G5 ... 3.80
Fairfield, Ala. T2 ... 3.60
Fontana, Calif. K1 ... 4.55
Gary, Ind. U5 ... 3.60
Geneva, Utah G1 ... 3.70
GraniteCity, Ill. G4 ... 4.30
Ind. Harbor, Ind. I-2, Y1 ... 3.60
Irvin, Pa. U5 ... 3.60
Lackawanna, N.Y. B2 ... 3.60
Munhall, Pa. U5 ... 3.60
Niles, O. N12 ... 5.25
Pittsburg, Calif. C11 ... 4.30
Pittsburgh J5 ... 3.60
Sharon, Pa. S3 ... 4.00
So. Chicago, Ill. W14 ... 3.60
SparrowsPoint, Md. B2 ... 3.60
Steubenville, O. W10 ... 3.60
Torrance, Calif. C11 ... 4.30
Warren, O. R2 ... 3.60
Weirton, W.Va. W6 ... 3.60
WestLeechburg, Pa. A4 ... 3.75
Youngstown U5, Y1 ... 3.60

SHEETS, H.R. (19 gage)
AlabamaCity, Ala. R2 ... 4.75
Dover, O. R1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.40
Mansfield, O. E6 ... 5.65
Niles, O. N12 ... 5.75
Torrance, Calif. C11 ... 5.40

SHEETS, H.R. (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ... 5.40
Conshohocken, Pa. A3 ... 5.65
Ecorse, Mich. G5 ... 5.95
Fairfield, Ala. T2 ... 5.40
Fontana, Calif. K1 ... 6.35
Gary, Ind. U5 ... 5.40
Ind. Harbor, Ind. I-2 ... 5.40
IndianaHarbor, Ind. Y1 ... 5.90
Irvin, Pa. U5 ... 5.40
Lackawanna (35) B2 ... 5.40
Pittsburgh J5 ... 5.40
Sharon, Pa. S3 ... 5.40
So. Chicago, Ill. U5 ... 5.40
SparrowsPoint (36) B2 ... 5.40
Warren, O. R2 ... 5.40
Weirton, W.Va. W6 ... 5.75
Youngstown U5 ... 5.40
Youngstown Y1 ... 5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ... 6.55
Ecorse, Mich. G5 ... 7.10
Fontana, Calif. K1 ... 7.50
Gary, Ind. U5 ... 6.55
IndianaHarbor, Ind. Y1 ... 7.05
IndianaHarbor, Ind. I-2 ... 6.55
Irvin, Pa. U5 ... 6.55
Lackawanna (37) B2 ... 6.55
Pittsburgh J5 ... 6.55
SparrowsPoint (38) B2 ... 6.55
Warren, O. R2 ... 6.55
Weirton, W.Va. W6 ... 6.90
Youngstown Y1 ... 7.05

UNIVERSITY OF MICHIGAN LIBRARIES

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana, Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23)F4	6.85

ROOFING SHORT TERNES (8 lb. coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, LONG Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary, U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind,Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.30
Lackawanna,N.Y. B2	4.96
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32)B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
NoTonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFracisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.35	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. NS:					
Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork, W3	...	...	10.30	12.50	15.35

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower) Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	4.50
Berea,O. C7	4.50
Bridgprt,Conn.(10) S15	4.65
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	4.60
Detroit D2	4.60
Detroit M1	4.45
Dover,O.(40) G6	4.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	4.85
Fontana,Calif. K1	4.70
FranklinPark,Ill.(40)T6	4.90
Ind.Harbor,Ind. I-2	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles C1	5.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	4.55
NewCastle,Pa. B4	4.55
NewCastle(40) E5	4.75
NewHaven,Conn. D2	4.85
Newhaven,Conn. A7	4.75
Pawtucket,R.I. R3	4.60
Pawtucket,R.I.(21) NS	4.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	4.55
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	4.60
Wallingford,Conn. W2	4.85
Warren,O.(40) T5	4.75
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown C8 (40)	4.75
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones& Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky. (8) A10	3.75
Warren,O. R2	4.10

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

TIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon,Pa. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville MS	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
Sparrows Pt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE, 16 gage	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Cleveland A7	8.55	8.80
Donora,Pa. A7	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
NewHaven A7	8.85	8.10
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Trenton,N.J. A7	8.85	9.10
Waukegan,Ill. A7	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill.(1) L1	4.85
Bartonville,Ill.(1) K4	4.85
Buffalo W12	4.85
Chicago W13	5.10
Cleveland A7, C20	4.85
Crawfordsville,Ind. MS	5.10
Donora,Pa. A7	4.85
Duluth,Pa. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.35
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8ga. I-1	5.50
No. Tonawanda B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville,Ind. MS	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
FranklinPark,Ill. T6	6.20
Massillon,O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.15
Worcester A7	6.15
Worcester T6	6.50
Worcester W12	6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. MS	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, Galv'd ACSR For Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	6.25
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill R2	6.25
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Buffalo W12	5.90
Cleveland, A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	7.10
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	7.10
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga.J5	130
Atlanta A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. MS	132
Donora,Pa. A7	130
Duluth A7	130
Fairfield,Ala. T2	130
Houston,Tex. S5	138
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen, Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So. Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville MS	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville MS	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburgh,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. MS	6.30
Donora,Pa. A7	5.95
Duluth A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. W10	7.15

NAILS & STAPLES, Stock To dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.10

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

AXLES

Ind.Harbor,Ind. S18	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	185.50
Cr Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2, V3.

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W.Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts.Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield,S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c,finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

UNIVERSITY OF MICHIGAN LIBRARIES

The Metal Market

Aluminum producers will build additional facilities following surveys showing future needs exceed previous high estimates. Expansion involves huge power projects

EXPANSION plans of the aluminum industry are being enlarged to meet upward revisions in estimated defense and civilian requirements. Programs previously announced provided for an increase in production this year of about 10 per cent over the 1950 total to around 800,000 tons and a goal by 1952 of 1,100,000 tons. Surveys now indicate that this capacity will be inadequate to meet the large volume of preparedness requirements which are superimposed on expanding commercial needs. Even with larger supplies to be made available from Canadian producers, aluminum supply and demand is not expected to be in balance for one or two years.

Aluminum Co. of America, Pittsburgh, plans construction of a $50 million smelting plant on a site adjacent to Rock Island dam, 12 miles south of Wenatchee, Wash., on the Columbia river. The plant will have a capacity of 85,000 tons annually and is scheduled to be in operation in 15 months.

Under a 50-year lease agreement between Puget Sound Power & Light Co., owner of Rock Island dam, and Chelan county public utility district, capacity of the power plant will be increased by 150 kilowatts, of which 120,000 kilowatts will be sold to Alcoa and the balance will be used by the power company as needed to 1955. At that time, Bonneville Power Administration will gradually take over Alcoa's power load.

Alcoa has reactivated certain standby production facilities at Massena, N. Y., and at Badin, N. C., which are uneconomical for normal operations. This part of the Alcoa program, known as the "quick action" plan, requires the use of high-cost power. It will provide 79,000 tons of aluminum annually for the government stockpile. Already it is supplying metal in substantial quantities for that purpose.

The second part of Alcoa's program involves the erection of permanent new capacity by the company. Through this expanded capacity, Alcoa will increase its production of aluminum by an additional 120,000 tons annually. Of this total, 35,000 tons will come from enlarged facilities at Alcoa's Point Comfort, Tex., works. The balance will be produced at Wenatchee. Reynolds Metals Co., Kaiser Aluminum & Chemical Corp., and other interests also are expanding their productive capacities.

Canada—Aluminum Ltd., Montreal, Que., will proceed with a huge expansion program in Canada. The expansion involves the first stage of a vast integrated aluminum development in British Columbia and another major hydroelectric power project in Quebec. Operations will be expanded in the Caribbean area to provide the needed intermediate alumina, derived from bauxite ores. The Canadian development will be undertaken by the company's subsidiary, Aluminum Co. of Canada.

Capital expenditures involved in the program presently planned total $220 million, of which $160 million is the estimated cost of the first stage of the British Columbia development, including the required alumina facilities. The remaining $60 million is the estimated cost of a new 200,000-hp hydroelectric plant on the Peribonka river in the Saguenay district of northwestern Quebec, together with new aluminum ingot facilities to be built in the district.

The expected increase in Canadian aluminum production capacity resulting from the proposed expansion program is 165,000 tons a year. This would bring total usable capacity to over the 550,000 tons mark. The company already is embarked on a $45 million program to develop an initial site on the Peribonka river to produce 200,000 horsepower and to provide about 45,000 tons of aluminum a year. The British Columbia project will require more than three years to complete.

While the annual rate of expenditure and the estimated completion date will depend upon the construction schedule adopted, it is planned to proceed without delay under a schedule which, if maintained, will bring production of the first aluminum in British Columbia in 1954. Estimated expenditure this year under the program now in effect will be $23 million.

STEEL'S Metal Price Averages for Apr., 1951

(Cents per pound)

Electrolytic Copper, del. Conn.	24.500
Lead, St. Louis	16.800
Prime, Western Zinc, E. St. Louis	17.500
Straits Tin, New York	145.735
Primary Aluminum ingots, del.	19.000
Antimony, f.o.b. Laredo, Tex.	42.000
Nickel, f.o.b. refinery	50.500
Silver, New York	90.160

Fabricast To Build Foundry

A plant for manufacture of aluminum castings will be erected at Jones Mills, Ark., by Fabricast Division, General Motors Corp., Detroit. The plant will have about 100,000 square feet of floor space and will employ ultimately about 1000 persons.

Construction of the plant will start as soon as materials are available. Production initially will be predominantly on defense items. Products will be castings from permanent molds, many of them of the highly intricate type used in torque converter transmissions.

Plans Aluminum Oxide Plant

Government permission to erect a plant for the production of crude aluminum oxide has been received by Carborundum Co., Niagara Falls, N. Y. The company is reported still undecided as to whether to build the plant outside the Niagara Frontier area or to expand its present facilities at Niagara Falls.

Light Metals Output Gains

More than 3000 persons are employed on an around-the-clock schedule at Kaiser Aluminum & Chemical Corp.'s aluminum reduction plant and rolling mill in the Spokane, Wash., area. This operation is furnishing large quantities of aluminum sheet for planes and other war activities.

The government's $20 million magnesium plant at Mead, north of Spokane, is expected to resume production about Aug. 1. At present, a rehabilitation program, costing $1.5 million, is under way.

Offers Heavier Brass Coils

An extensive modernization of the brass sheet and strip mill of American Brass Co. in Buffalo, N. Y., is practically completed. The $2.5 million program was launched early in 1950. The mill is now in full production and is turning out heavier coils of brass than was possible previously.

NPA Revises Aluminum Order

Makers of aluminum windows, window screen frames and openers for loose-leaf ledgers will be permitted to use more of the light metal in May and June than was scheduled originally. National Production Authority said makers of these products can use in each of the months 65 per cent of their average windows for factories as well as for homes. NPA's action was taken in the form of an amendment to order M-7.

Previously, NPA had indicated that these manufacturers would not be permitted to use in either May or June over 50 per cent of their average monthly consumption in the base period.

Manufacturers of many other aluminum products, such as medicine cabinets and roofing, are still limited to 50 per cent of their average monthly consumption in the first half of 1950.

Britain To Get More Aluminum

Principles of a new agreement have been reached to provide for further increases in shipments of Canadian aluminum to Great Britain in the years 1952 to 1954, inclusive, and extensions to present financial arrangements between the British government and Aluminum Co. of Canada, principal subsidiary of Aluminum Ltd.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c. Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 44.50c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.75-32.50c; No. 12 foundry alloy (No. 2 grade) 30.75-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.75-33.50c; grade 2, 30.00-31.50c; grade 3, 30.00-30.50c; grade 4, 28.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 142.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50c; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $215-$220 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 41.03; yellow brass 37.84; commercial bronze, 95%, 40.99; 90%, 40.55; red brass, 85%, 39.59; 80%, 39.15; best quality, 39.15; nickel silver, 18%, 51.91-52.36; phosphor-bronze grade A, 5%, 60.20-62.82.

Rod: Copper, hot-rolled 36.88; cold-drawn 38.13; yellow brass free cutting, 32.23; commercial bronze, 95%, 40.68; 90%, 40.24; red brass 85%, 39.28; 80%, 38.84.

Seamless Tubing: Copper 41.07; yellow brass 40.85; commercial bronze, 90%, 43.21; red brass, 85% 42.50.

Wire: Yellow brass 38.13; commercial bronze, 95%, 41.28; 90%, 40.84; red brass, 85%, 39.88; 80%, 39.44; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lenghts 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	Round— R317-T4, 17S-T4	Round— R317-T4	Hexagonal— 17S-T4
0.125	52.0	...	...
0.156-0.188	44.0	...	...
0.219-0.313	41.5	...	...
0.375	40.0	46.0	48.0
0.406	40.0	...	...
0.438	40.0	46.0	48.0
0.469	40.0	...	...
0.500	40.0	46.0	48.0
0.531	40.0	...	...
0.563	40.0	...	45.0
0.594	40.0	...	...
0.625	40.0	43.5	45.0
0.688	40.0	...	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	...	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	...	...
1.625	36.5	...	39.5
1.688-2.000	36.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast 37.375c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98% ½-oz. ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c, f.o.b. Cleveland.

Nickel Chloride: 100-lb keg, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red Brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 29.00; No. 2 copper 27.50; light copper 25.00; composition red brass 25.00-25.50; radiators 20.00; heavy yellow brass 19.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry coper content 20.00.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 25.50-26.50; No. 2 24.00-25.00; light copper 22.00-22.50; No. 1 composition red brass 22.00-23.00; No 1 composition turnings 21.00-22.00; mixed brass turnings 13.00; new brass clippings 20.00-21.00; No. 1 brass rod turnings 19.00; light brass 15.00; clean heavy yellow brass 17.50; new brass rod ends 19.50; auto radiators 17.50-18.00; cocks and faucets, 19.00-19.50; brass pipe 20.00-20.50.

Lead: Heavy 16.50-16.75; battery plates 9.50-10.00; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

Zinc: Old zinc 12.50-13.00; new die cast scrap 12.50-13.00; old die cast scrap 8.25-8.50.

Tin: No. 1 pewter 80.00-85.00; block tin pipe 110.00-120.00; No. 1 babbitt 70.00-75.00.

Aluminum: Clippings 2S 21.50-22.00; old sheets 17.00-17.50; crankcase 17.00-17.50; borings and turnings 13.00-14.000.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
May 1-3	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 17-30	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 12-16	24.50	16.80	17.50	147.00	19.00	42.00	50.50	90.16
Apr. 9-11	24.50	16.80	17.50	150.50	19.00	42.00	50.50	90.16
Apr. 6-7	24.50	16.80	17.50	150.00	19.00	42.00	50.50	90.16
Apr. 5	24.50	16.80	17.50	149.875	19.00	42.00	50.50	90.16
Apr. 4	24.50	16.80	17.50	150.00	19.00	42.00	50.50	90.16
Apr. 3	24.50	16.80	17.50	149.50	19.00	42.00	50.50	90.16
Apr. 2	24.50	16.80	17.50	150.50	19.00	42.00	50.50	90.16
Apr. Avg.	24.50	16.80	17.50	145.735	19.00	42.00	50.50	90.16
Mar. Avg.	24.50	16.80	17.50	145.730	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

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CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Apr. 19, 1951

STEELMAKING SCRAP COMPOSITE

May 3	$44.00
Apr. 26	44.00
Apr. 1951	44.00
May 1950	33.82
Apr. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade)1

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry Steel:	
20. 2 feet and under	+ 2.00
21. 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively. (2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10. (3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth. (4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and open-hearth furnaces or foundries. (5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering. (2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12. (3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames	
22. Uncut	Base
23. Cut	+ 3.00
24. Angle, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.

(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.

(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:

1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable)	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 3 cast iron.

(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $11.
(8) For preparing into Grade No. 18 or Grade No. 20, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:

(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

No preparation charge in excess of charges set forth above may be made for preparation of any grade of scrap unless the consumer has secured prior written OPS approval.

Commissions

No commissions shall be payable to a broker in excess of $1.

Unprepared Scrap

The term "unprepared scrap" shall have its customary trade meaning.

For unprepared scrap, other than materials suitable for hydraulic compression, ceiling basing point prices shall be $8 per ton beneath ceiling of the prepared base grades.

For unprepared material which when compressed constitutes No. 1 bundles, ceiling basing point price shall be $6 per ton beneath ceiling for No. 1 bundles; or when compressed constitutes No. 2 bundles ceiling basing point price shall be $8 beneath ceiling basing point price for No. 2 bundles.

Any iron casting which cannot be broken with an ordinary drop into Grade No. 1 or No. 2 may not be classified as Grade No. 3. Where such iron casting requiring blasting or other special preparation is sold to a consumer, the shipping point price for Grade No. 3 must be reduced by amount of additional charges required for preparation.

Special Pricing Provision

Ceiling price of clean cast iron foundry runouts, spills, or cupola drops prepared by cleaning or breaking is 75% of corresponding cast iron grade.

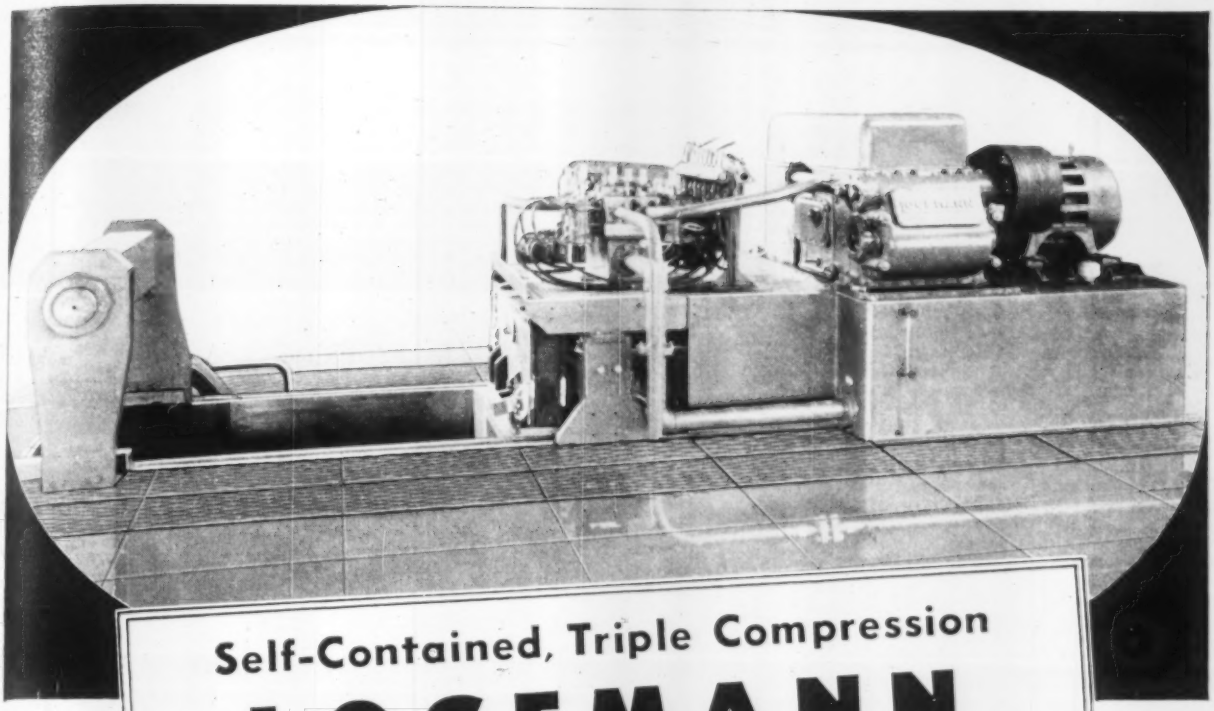
Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Federal, Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.



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Sheets, Strip . . .

Sheet and Strip Prices, Page 183 & 184

Pittsburgh—Sheet supply is tight. DO set-asides take 25 per cent of hot-rolled production and programs take most of the balance. One local producer has not offered hot-rolled sheets since February. DO hot-rolled sheets are obtainable in some cases as early as September but some mills are booked into 1952. DO set-asides take 15 per cent of the cold-rolled production. Rated orders can obtain August delivery from most mills. Zinc-coated sheets are going to defense work at the 10 per cent rate, and will be available for August shipment if the grain bin program is not increased.

Container program alone will take 9000 tons of cold-rolled sheets in June.

Cleveland—Sheet and strip producers see little chance for any improvement in supply conditions over coming months insofar as unrated accounts are concerned. Mill order books now are loaded with defense and defense-support tonnage extending into third quarter and beyond. At the same time pressure from government contractors is increasing indicating that the peak of such demand is still distant. In such circumstances there is no way for producers to estimate the amount of tonnage that will be available for their unrated customers after mid-year when the Controlled Materials Plan goes into effect.

Boston—Distribution schedules for July on silicon and stainless reduce volume for non-defense use. Practically all flat-rolled stainless tonnage is covered by ratings. CMP is not expected do be efficiently operative that month and, where allocations are made for those grades, demand is expected to approximate June pattern with heavier emphasis on defense. Mills are frequently behind delivery schedules on sheets; some rated tonnage scheduled for September-October will be required well before those months. New orders for some consumer hard goods are off, but most manufacturers of these items are taking all steel available. Cold strip producers supplying steel for cartridge clips, belt links and small arms components have the largest backlogs of rated orders.

New York—Most producers of hot and cold-rolled sheets have little tonnage to offer against DO ratings before September, and on galvanized sheets little before October. Promises on silicon sheets run into October and November. DO promises on stainless sheets, however, are relatively easy, some sellers offering July and August.

Philadelphia — Sheet sellers are awaiting word from Washington, particularly with regard to directive programs, before going ahead with scheduling for July. While CMP is scheduled to go into effect July 1, most sellers doubt if there will be much change in procedure of distribution until the third quarter is further under way. Promises on hot and cold-rolled sheets fall in August and September; galvanized sheets, in October; stainless, July and August.

Cincinnati — Rated tonnage order backlogs continue to rise at district sheet mills. Ordering recently showed decided upturn for electrical and coated sheets. Trimming of civilian allotments for May and June probably more than wiped out any cutbacks not due to shortage of materials in sheet buying.

Chicago — Inland Steel Co. this month began marketing a high-quality continuous galvanized sheet made under the Armco Sendzimir patented process. Production is limited. It is offered in either coils or sheets from 14 to 28 gage, and from 24 to 48 in. in width. Only cut lengths to these gages and widths can be specified at present under regular customer quotas. The product is priced at $5.05 per 100 pounds f.o.b. Indiana Harbor, Ind.

St. Louis — Cold-rolled sheet supplies gradually tighten with mounting consumer demand. Granite City Steel Co., with 40 per cent of its tonnage already defense captured, this week will issue smaller allocations to sales offices based on company guesses as to what CMP will take.

Birmingham—DO tonnage on mill books is rising. Sheet inventories of consumers are extremely low and pressure for additional tonnage continues.

Los Angeles—Reduction of flat-rolled allocations from 25 to 65 per cent for May and June will cut some fabricators' inventories 50 per cent from January levels.

San Francisco — Some local steel trade authorities prefer a complete Controlled Materials Plan to the open-end program scheduled to go into effect July 1. The task of allocating tonnage to unrated consumers from the leftover after defense requirements are met is expected to prove as difficult as under the present priority system. Many metalworking shops, it is felt, will find supplies tighter than ever unless they can obtain government work.

PRICES UNCHANGED

For current quotations on refractories, pipe, boiler tubes, stainless steels, clad steels, metal powders, bolts, nuts, rivets, washers, electrodes, coal chemicals, fluorspar, ferroalloys, coke, refer to pages 146-147, STEEL, Apr. 9, 1951 issue.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York(c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city) ..	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.98
Boston (c'try) .	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city) ...	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try) ..	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city) ...	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try) ...	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va. ..	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va..	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse) .	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.) ..	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††‡	6.00	6.25	7.55
Buffalo (w'hse).	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††‡	5.80	6.05	7.35
Pitts. (w'hse)..	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse).	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse) .	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city) ..	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city) .	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try).	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.).	6.05	6.85	8.20	6.00	...	6.00	6.85	10.55	6.23	6.33	7.53
St. L. (w'hse)..	5.85	6.65	8.00	5.80	...	5.80	6.65	10.35	6.03	6.13	7.33
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm (city).	5.75	6.55	6.90[3]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm.(w'hse)	5.60	6.40	6.75[3]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)..	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco..	6.65	7.80[4]	8.90[3]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma.	7.05	8.60[3]	9.20[3]	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]3500 lb and over; [5]—1000 to 1999 lb.

Tubular Goods . . .

Boston—Pipe quotas to distributors for June vary depending on how deep defense volume is cutting into schedules. Unrated open tonnage is down reflecting increase in industrial demand taking ratings. Total of 775 miles of laterals, 3 to 22 in. will be required ultimately for natural gas distribution in New England. This is exclusive of main line. Under current allocations, utilities have slight chance of obtaining this tonnage without some form of directive.

Chicago—One producer of tubular goods reports about 25 per cent of overall output is rated tonnage. Individually, however, some items run up to 35 per cent. Of pipe production, 5 per cent is going into various allocation programs, 10 per cent carry DO's and 59 per cent is channeled to the M-6 program (steel warehouses).

St. Louis—Contrary to expectations two months age, pipe demand is sharply higher. Residential construction in the area is unabated and jobbers are pleading for plumbing sizes.

Steel Bars . . .

Bar Prices, Page 183

Cleveland — Bars are about the tightest supply item at present. This is especially true of alloy grades with producers booked on DO tonnage as far ahead as next January. One seller in this area reports it is not accepting alloy bar orders for other than defense and defense-support account. This interest is booked into August on hot-rolled alloy bars, into November on cold-finished alloy, and into January on turned, ground and polished bars.

Boston—Volume of alloy bars for civilian use has reached lowest point. Leaner specifications are offered. Influx of hot-rolled carbon and alloy DO orders is heavier, also cold-finished. Mills are booked into October on rated tonnage. Forge shops contribute heavily to this volume.

New York—Demand for hot carbon bars is brisk as indicated by extended delivery promises on DO-rated orders. Some sizes are available for late August but, for the most part, promises call for September delivery and beyond. Certain larger sizes are quoted for shipment late in fourth quarter. Cold-drawn carbon bars are quoted for shipment in September and beyond. Alloy bars, where annealing is necessary, are quoted generally for fourth quarter.

Philadelphia—Producers of hot carbon bars promise deliveries against DO-commitments ranging from July to January, depending upon specification. The more extended promises are on the larger shell steel sizes. Alloy bars can be had for September, but where special treatment is required, mill promises are much more extended.

Pittsburgh—Demand pressure for hot rolled bars is increasing. Defense and defense-support programs are taking larger tonnages for June. Unrated users are hard pressed to obtain hot bars.

Barmakers doubt the Controlled Materials Plan will have much effect on their production schedules. They think it will take at least three months to iron out the details of the new system.

Cold-finished bars are in short supply but many small purchasers feel that with the coming of CMP in July more cold bars will become available. Producers think differently. They state smaller tonnage will be open to non-rated users.

Plates . . .

Plate Prices, Page 183

Philadelphia—Some plate mills will go into July with arrearages of one week and longer, which will further shrink the supply of non-rated tonnage available in that month. Meanwhile, some leading producers of plates have nothing to offer against regular DO-ratings before October, although some can still take a little for late August and September. On strip plate, August is the general promise. Mills are still awaiting definite word as to directive programs for July.

Pittsburgh — Plate producers are awaiting classification of CMP details before setting rolling schedules for July. Sellers are reluctant to accept tonnage until handling procedures under the new plan are definite. DO set-asides continue at 25 per cent. Demand pressure for both light and heavy plates is strong. No slackening is expected since under CMP more plates than presently may be taken for defense-support programs. Most producers here are booked with DO set-asides through third quarter.

Birmingham—The supply of plates grows progressively tighter. Mills are producing at capacity but output is not sufficient to meet all requirements.

Boston—Stringency in plates is enhanced by an abnormal demand for material rolled from hot-topped ingots. Hot-topping capacity of most producers is over-taxed, increased demand for rolled armor plate being an important factor. Liquid petroleum gas tanks are absorbing a larger tonnage of pressure vessel grade plates. Additional landing barge contracts have been placed in Maine, taking better than 10,000 tons.

New York — Some strip plate is available for shipment against DO orders as early as August but most sellers have little available in the way of sheared and universal plate bofore September, in some instances October. Unfolding of greater detail as to operation of CMP is expected shortly and should be fairly cleared up within a week, as producers will be confronted with the scheduling of unrated tonnage for July.

Wire . . .

Wire Prices, Page 185

Boston—Defense wire volume, although increasing, is still below average for other steel products. This is notably true of carbon. Largest contracts placed thus far have been for signal wire. Civilian demand is strong. Demand for wire for automobile assembly has not slackened.

Birmingham—The supply of wire products is limited. No item in wire is even approaching surplus stage, but the shortage seems to change regularly from one item to another.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 183

Cleveland—Strong demand for reinforcing steel is encountered but bar supplies are limited. The building season is well under way and considerable work is being offered. However, shortage of steel may force postponement of some projects, especially public work. Currently interest in the market centers on plans of the Office of Price Stabilization to set up regulations covering the reinforcing industry. Some in the industry favor a dollar-and-cents mark-up over mill base prices plus quantity and other extras. Others, however, feel a pricing formula that permits each seller his own historical mark-up in a base period is preferable.

Tin Plate . . .

Tin Plate Prices, Page 184

Chicago—Freight car supply has improved markedly, the principal deficiency now being gondolas. However, the situation varies from plant to plant.

Structural Shapes . . .

Structural Shape Prices, Page 183

Boston—Likelihood of all-out allocation of structurals prompts fabricators to seek direct defense or subcontracts to supplement DO contracts already on books. Latter volume is not enough for sustained capacity operations.

New York—Several sizable structural projects are pending, including 15,000 tons for the superstructure of the New York Central lift bridge over the Harlem river and 7000 tons for the East Harlem general hospital. Approximately 18,000 tons will be required this summer for the South Street viaduct.

Meanwhile, mounting demands are reaching a point where stricter control over all types of building will be inevitable by fall. Many projects, including some hospital and school construction, will have to be deferred for at least a year due to shortages.

Philadelphia — Uncertainty as to prospects for obtaining steel is holding up substantial structural demand. Some definitely approved work is going ahead in this district; some is being given up entirely; other work is held in abeyance until further light is shed on CMP and its ramifications.

Pittsburgh—Structurals and small shapes continue in extremely short supply. Large tonnages are going into industrial expansion. Fabricators report some construction jobs are idle due to the lack of steel. This condition has caused builders to turn down certain non-rated construction work.

Los Angeles — With fabricators clamoring for structurals, industry observers wonder how it is possible that the new Bank of China building in Shanghai is being completed with structural steel reported from the United States.

Seattle — Fabricating plants face the most active season in several years. Steel supply is very tight. Demand for small tonnage is strong.

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Iron Ore . . .

Iron Ore Prices, Page 200

Cleveland—Flow of iron ore from upper lake ports is unusually large for this early in the shipping season. For the week ended Apr. 30 shipments aggregated 2,421,414 tons, making the cumulative season total to date 5,939,320 tons compared with only 304,392 tons for the like period a year ago. The port of Ashland opened during the last week of April, shipping 9764 tons.

Pig Iron . . .

Pig Iron Prices, Page 182

New York—Severe pig iron shortage is developing here. Virtually all producers supplying district foundries have had to curtail shipments. The leading Buffalo interest has not only had to take off its furnace which has been supplying silicon iron badly needed for sweetening foundry mixes, but will shortly have to take off another furnace for major repairs, thus leaving little tonnage this seller can offer the merchant trade.

Foreign iron is coming in against old orders, but not enough to greatly relieve the situation. As far as new offerings are concerned most of the tonnage is basic for extended delivery, and costly. And such exceptions as are noted are especially costly. For instance, 1000 tons of Belgian foundry iron is being offered around $90 CIF.

Some foundries are curtailing production and confront complete suspension unless relief is provided. Certain shops have reached the point where they are unable to use more than 15 per cent iron in their mix, and to make matters worse, are unable to get ferroalloys as required.

Boston—Additional foreign basic has been purchased by steel mills at $70, dock. Foundries are obtaining enough iron for current operations, but most of them carry small inventories. Domestic shipments from outside New England are low.

Buffalo—Pig iron production is slated to rebound to 100 per cent of capacity this week as the Bethlehem Steel Lackawanna plant planned to relight its sixth unit, shut down about five weeks ago for relining. Meanwhile, merchant iron sellers report pressure for deliveries. Some improvement is noted in the railroad car situation.

Philadelphia—Pig iron is scarce, with some consumers confronted with sharp curtailments in production unless relief is afforded. The Chester, Pa., furnace may go into blast within a few weeks, with ore schedules to come in from the Isle of Pines. Meanwhile, several thousand tons of Turkish basic, said to be a bit high in carbon, is being offered at around $71 c.i.f., for further shipment.

Pittsburgh—Foundries operate on day-to-day pig iron inventories. Operations at some shops are curtailed because of iron shortage. Shipments from outside this area are helping but these shipments are not in large enough quantities to alleviate the critical situation much.

Cleveland—Foundry operations in this district are being maintained on 5 and 6-day per week schedules despite the shortage of pig iron. But its a nip-and-tuck battle all the time. Few shops are carrying any iron inventory to speak of, some of them being on a virtual hand-to-mouth supply basis. No improvement in conditions is likely soon. In fact, melters anticipate severe stringency late this summer when American Steel & Wire Co. is scheduled to take one of its local stacks out of production for extensive repairs.

With this curtailment only a few months away foundrymen dependent on this furnace are casting about for new sources of supply but without much success. Some are considering foreign iron but are encountering difficulty with imports reportedly drying up. Some foreign iron is still available for July and August but tonnage is not large, and commands a high price.

Chicago—Foundry operations are hampered by low inventories of pig iron, scrap and coke. Adjustments in schedules are made from day-to-day because of supply imbalance. Meanwhile, rated orders for castings creep up slowly.

Of the district's 42 blast furnaces, 41 are active. Inland Steel Co. on Apr. 25 restored its "A" stack idled in mid-March because of ore shortage. It will produce basic until about middle of May, then swing over to a two-week run on malleable.

Youngstown's Sheet & Tube Co.'s No. 5 Iroquois furnace, which went down for relining Mar. 26 will come back in around May 15.

Within the near future, United States Steel Co. will be obliged to reline some of its 23 stacks.

Wisconsin Steel Co. plans to idle a furnace around July 1 for relining and enlargement.

Birmingham—Pig iron production in March in this district topped all records. However, merchant producers report the going still "tough" and they see no relief so long as demand holds at the current level.

Los Angeles—With all pig iron output of Kaiser Steel Co. and Geneva Steel Co. required for their own steel production, no metal is available for outside sales from these sources. Shortage of iron is at the critical stage for West Coast foundries.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 200

Pittsburgh—Export quota for the second quarter 1951 on metallurgical and foundry coke of 15,000 short tons is occasioned by attempts of Swedish interests to obtain several hundred thousand tons. Establishment of the quota by the Commerce Department will prevent "bleeding" the domestic market.

Beehive furnace coke market here is slow but is expected to become more active when idle blast furnaces in the district resume operation. An additional 40,000 tons per month will be required when relining of United States Steel Corp.'s Carrie No. 7 stack is completed this month. Pittsburgh Steel Co.'s stack at Monessen, Pa., goes into full operation early this week

Foundry coke is scarce but no serious complaints about supply are heard. This is because the coke obtainable is ample with respect to the pig iron, which is the chief problem for the foundries.

Cleveland—Substantial quantities of beehive foundry coke are coming into this area to offset the severe shortage in oven grade. As a result, while inventories are limited, foundry receipts of both grades are sufficient to support melts at the current high rate.

Washington—Export quota of 15,000 short tons of metallurgical and foundry coke for second quarter is announced by the Office of International Trade, Department of Commerce. Petroleum coke is not affected. The quota is the same as in first quarter when controls were reimposed.

Scrap . . .

Scrap Prices, Page 188

Pittsburgh—Collections in the district improved considerably the past week. Foundries' inventories are low and operations may have to be cut slightly to match receipts of scrap. Reports of OPS investigations in other market areas are prevalent here but no evidence of any inspectors operating in this area is uncovered.

Philadelphia—Steel scrap consumers' inventories are about holding their own. Despite the seasonal improvement in shipments, most consumers until recently still had to draw on their stocks. Stocks are still low and there is a severe shortage of heavy scrap. Most of the material coming to dealers' yards is light and has to be baled.

Boston—Movement of steel scrap to consumers has improved slightly, but complaints as to quality continue. Inventories of both steel and cast grades are well below normal. Allocations are of some help.

New York—While scrap consumers' inventories are leveling off as a result of the somewhat better seasonal movement of material, stocks generally are very low with some distress cases noted. Terrific pressure is being placed upon suppliers to develop tonnage so that operating rates at consumer plants may be sustained.

Buffalo—Mill consumers are concerned over the light flow of scrap. Mills' reserve stocks remain low ebb as dealers report favorable weather has failed to bring out any appreciable amount of scrap. Minor gains are noted in flow of industrial grades, but they are not up to seasonal expectations. Scrap receipts from eastern seaboard via the canal also are slow in expanding.

Detroit—Mills are starting to see bottom of scrap stockpiles, a condition common for foundries for some time. Many feel allocation of all scrap is inevitable. Dealer scrap is slow moving and industrial scrap generation has slowed down, although automaking rate is well sustained and is even expected to show some overall gain this month.

Cincinnati—Rapid rate of melting is putting pressure on scrap collectors. Demand is outrunning supply despite fair shipments. Allocations are playing a vital part in keeping some foundries and mills on schedules. Most acute shortage is in electric furnace material.

Chicago—Allocations of steelmaking scrap out of this district have reduced inventories to the point where melting operations are jeopardized and

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Titanium	15.00%	Titanium	20.00%	Zirconium	4.00%
Boron	0.20%	Boron	0.20%	Manganese	8.00%
				Boron	0.50%
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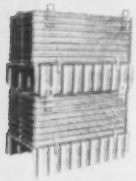

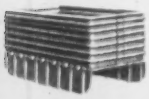

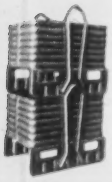

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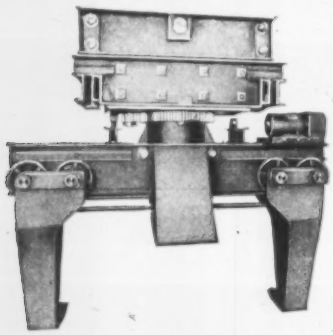

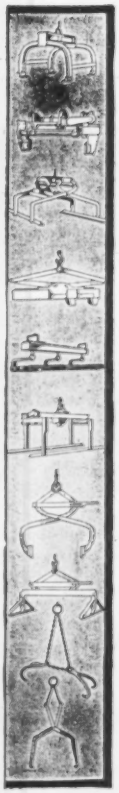

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reallocations into the area are required. One steel plant applied to NPA for assistance and received a few hundred tons, a mere drop in the bucket compared with tonnage diverted during recent weeks. Other mills are on the verge of applying for allocations as stocks border on the critical. Foundries are just now beginning to benefit from NPA's recent prohibition of use of cast grades in open hearth furnaces.

St. Louis—Scrap trading is picking up with better shipments. More dealer scrap is under allocations from big yards. Mill and foundry stocks average under 30 days.

Los Angeles — The potential purchased scrap deficit for the West Coast may reach 500,000 tons by the end of 1951, according to H. W. Christensen, director of purchases, Columbia Steel Co.

San Francisco — Scrap allocations out of this district by the National Production Authority involve both railroad and industrial material. However, dealer scrap is not disturbed. Shipments of foreign material have ended for the present. No additional imports are sighted for the immediate future.

Seattle—More favorable weather is conducive to better scrap shipments from the interior. Receipts are heavier but not sufficient to materially enlarge inventories. Larger buyers are organizing committees to stimulate collections. Bethlehem Pacific Coast Steel Corp. has just received 9000 tons of high grade material from the Philippines but no additional imports are reported in sight. As high as $54 is reported to have been paid by local buyers for railroad scrap.

OPS Pegs Nickel Scrap Prices

Washington — Ceiling prices for nickel scrap, based on a price of 40.50c a pound for the basic grade at point of shipment, were fixed by the government. The new prices represent a roll-back for some dealers who, OPS claimed, had ceiling prices under the general price freeze order as high as $2 a pound. These high prices for nickel scrap compared with the ceiling price of 50.50c a pound for primary nickel.

Price regulation No. 29 covers pure nickel scrap, monel metal scrap, stainless steel scrap, ferro-nickel-chrome-iron scrap and cupro-nickel alloy scrap. It does not cover brass mill nickel scrap. The order, effective May 8, provides dollars and cents ceiling prices for various grades of scrap, as well as premiums for quantity shipment and for converted scrap.

Ferroalloys . . .

Washington—Slightly higher prices on standard ferromanganese are under consideration due to increased production costs resulting from shortage of high-grade manganese ores necessitating greater use of lower grade material.

Warehouse . . .

Warehouse Prices, Page 190

Pittsburgh — Distributors expect CMP to result in definite loosening in the warehouse market. Receipts

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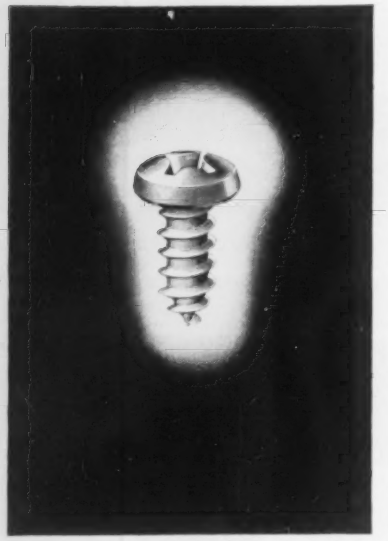

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for June will be on the order of 85 per cent of base tonnage as set forth in the March amendment to M-6.

Cleveland—Reported slackening of activity in some consumer durable goods lines is not reflected in any letup in demand for steel in the local warehouse market. Stocks are low and unbalanced, however, and the volume of business done varies from warehouse to warehouse, dependent on the individual distributor's inventory position. Recipts from the mills are described as fair. Some improvement in this respect is expected in June when effect of revised NPA order M-6 should be noticeable. This order stipulates that the mills provide the warehouses steel volume equal to 85 per cent of their receipts in the base period, first 9 months of 1950.

Cincinnati—Pressure for warehouse steel is unrelenting, even though some shifting in sources of demand are noted as a result of increasing stress on defense programs.

Fasteners . . .

Cleveland—Some industrial fastener manufacturers are just about scraping the bottom of the steel supply barrel. For months past they have been fighting a losing battle since they have had no allocation with which to replace tonnage absorbed in filling defense-support business. This situation is corrected beginning this month, but not much change in supply conditions is anticipated for several weeks.

Rails, Cars . . .

Track Material Prices, Page 185

Houston—Contract for 44 miles of 85 lb rail for installation at the U. S. naval ammunition depot at Camden, Ark., was placed with L. B. Foster Co. In addition the company received orders for angle bars, tie plates, spikes, frog and switch equipment and other track accessories.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7150 tons, power plant, Board of Transportation, East 74th street, Manhattan, to Bethlehem Steel Co.

4514 tons, Congress Street Expressway, grade separation between Canal and Desplaines streets, Chicago, to Allied Structural Steel Companies, Chicago; Thomas McQueen, Forest Park, Ill., general contractor.

1750 tons, McNary dam powerhouse roof trusses, etc., to Bethlehem Pacific Coast Steel Corp., Seattle; Atkinson-Ostrander-Jones, Umatilla, Oreg., general contractor.

1700 tons, power plant, DuPont interests, Dunbarton, S. C., through Gibbs & Hill, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.

1200 tons, plant, Bell Aircraft Co., Hurst, Tex., to Mosher Steel Co., Houston.

1100 tons, warehouse, Mennen Co., Morristown, N. J., to Bethlehem Steel Co.

1000 tons or more, central portion Granville street bridge, Vancouver, B. C.; also reinforced concrete approaches; general contract to British Columbia Bridge & Dredging Co. Ltd. and Dawson, Wade & Co. Ltd., Vancouver, low $6,254,376.

350 tons, Eastside elementary school, Wilmington, Del., to Bethlehem Steel Co.

335 tons, state bridge, Lehigh county, Pennsylvania, to American Bridge Co., Pittsburgh.

300 tons, hospital, Norwalk, Conn., to Harris Structural Steel Co., New York.

285 tons, miscellaneous building construction, Ridgefield, N. J., to Elizabeth Iron Works, Elizabeth, N. J.

200 tons, superstructure, grade separation, 5... Larramie Ave., Chicago, to American Bri... Co., Pittsburgh; Overland Construction C... Chicago, contractor.

200 tons, three Montana street bridges, ... Bethlehem Pacific Coast Steel Corp., Seattl...

170 tons, vocational high school, New Bedfor... Mass., to Groisser & Shlager Iron Wor... Somerville, Mass.; Olson & Appleby, N... Bedford, general contractor.

115 tons, boiler supports, Combustion En... neering Co., Albany, N. Y., to Pittsburg... Bridge & Iron Works, Pittsburgh.

100 tons, four sets of stop logs, beams, e... Detroit dam project, to Schmitt Steel C... Portland, Oreg., low $30,199, to U. S. En... gineer, Portland.

100 tons, Chulitna river bridge, Alaska; ge... eral contract to M. P. Butler, Seattle, lo... $105,850; steel furnished by Alaska Railroa...

STRUCTURAL STEEL PENDING

15,000 tons, lift bridge over the Harlem rive... New York, for New York Central; pending.

7000 tons, general hospital, East Harlem... N. Y.; bids May 20.

2445 tons, double leaf bascule bridge, Meriden... street, East Boston, Mass.; bids June 5.

1200 tons, laboratory, Westinghouse Electric... Corp., Philadelphia; bids May 10.

1000 tons, Ross dam powerhouse, Seattle city... light department; Isaacson Iron Works... Seattle, low, $305,000.

900 tons, tower work, DuPont interests, Dunbarton, S. C.; bids asked by Gibbs & Hill... New York.

650 tons, plant addition, National Union Radio... Corp., Philadelphia; bids May 9.

250 tons, also 200 tons piling and 60 tons... reinforcing bars, two bridges for Alaska... Road Commission; J. J. Badraun, Seattle... general contractor, low $458,359.

150 tons, Memorial Hospital, Milford, Del.; bids closed May 2.

Unstated, Army refrigerated warehouse, etc., Fort Richardson, Haddock Engineers Ltd., Seattle, low to U. S. Engineer, $2,393,000.

Unstated, training facility building, Fort Richardson, Alaska; Morrison-Knudsen Co. and Peter Kiewit Sons Co., joint low to U. S. Engineer, $1,949,000.

Unstated, field maintenance ordnance shop, Fort Richardson; J. H. Pomeroy Co., Inc., San Francisco, low to U. S. Engineer, $919,023.

Unstated, 100-ton overhead traveling crane for Big Cliff dam, Oregon; bids to U. S. Engineer, Portland, Oreg., May 24.

Unstated, 38 spillway crest gates and appurtenances, Rock Island dam, Washington state; bids to Stone & Webster, Boston, May 15.

REINFORCING BARS . . .

REINFORCING BARS PLACED

6000 tons, siphons, East Low canal, Columbia Basin project, to Bethlehem Pacific Coast Steel Corp., Seattle; J. A. Terteling & Sons, Boise, Idaho, general contractors.

500 tons, miscellaneous small contracts, Alaska defense construction and local industrial projects, to Bethlehem Pacific Coast Steel Corp., Seattle.

REINFORCING BARS PENDING

1525 tons, substructure and approaches, Charlestown connection, contract B-1, Central Artery, Boston; Berk More Co. Inc., Boston, low; also on B-3, section of deck and electric work.

360 tons, superstructure, multi-span continuous truss bridge, Merrimac river, Amesbury-Newburyport, Mass.; bids rejected.

155 tons, project 1E3, Baltimore-Washington parkway, Prince Georges county, Maryland; bids May 18, Bureau of Public Roads, Arlington, Va.

100 tons, repairs, Commonwealth pier viaduct, Boston; James S. Kelliher, Quincy, Mass., low, general contract.

Unstated, nurses quarters, etc, Alaska Native Service, Anchorage, Alaska; J. C. Boespflug Co., Morrison-Knudsen Co. and Peter Kiewit Sons Co., Seattle, joint low $2,093,521.

Unstated, 42 eight-family quarters Ladd air field, Alaska; Peter Kiewit Sons Co., Seattle, low $551,300.

Unstated, warehouse, Elmendorf field, Alaska; bids to U. S. Engineer, Seattle, May 9.

Unstated, organizational maintenance shop

...uilding, Fort Richardson, Alaska; bids to ... S. Engineer, Seattle, May 15.
...stated, two maintenance shop buildings, ...dd and Eielson air fields, Alaska; bids to ... S. Engineer, Seattle, May 23.
...stated, indoor facility training building, ...dd air field, Alaska; Kuney-Johnson Co., ...eattle, low $550,000.
...stated, (also steel trusses and I beams) ...achine shop, Othello, Wash.; Cherf Bros., ...phrata, Wash., low to Bureau of Reclama... $124,098.

PLATES . . .

RAILS PLACED

10,000 tons, fifty 120-foot landing barges, Army, to Portland Copper & Tank Works, South Portland, Me.
415 tons, tank, New London Tank Co., New London, Conn., to Bethlehem Steel Co.
100 tons, 104 propane tanks, 500-gallon capacity each, Fort Devens, Mass., to A. O. Smith Corp., Milwaukee.

PLATES PENDING

Unstated, two jet fuel tanks, total 17,000-bbl capacity, Navy station Whidby Island, Washington; bids to 13th. Naval District, Seattle, May 18.

PIPE . . .

CAST IRON PIPE PENDING

250 tons, 6000 feet of 14 inch cast iron pipe, system replacements; bids to H. F. Green, city clerk, Puyallup, Wash., May 9.
200 tons, 3438 feet of 18 inch cast iron pipe also alternative bids, for sewer project; bids in to L. H. Unzelman, commissioner, Everett, Wash.

RAILS, CARS . . .

RAILROAD CARS PLACED

Northern Pacific, 250 seventy-ton gondola cars, to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Union Pacific, 50 passenger train cars, pending; list comprises 16 sleeping, 14 chair, 10 baggage, 6 dining, 2 mail-baggage and 2 baggage-dormitory cars.

LOCOMOTIVES PLACED

Atlantic & West Point, one 1200-hp diesel-electric switching unit, to Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

Chesapeake & Ohio, 107 diesel-electric locomotive units, to Electro-Motive Division, General Motors Corp., La Grange, Ill., and to General Motors Diesel Ltd., London, Ont.; the former will build twenty-one 1200-hp switching units, twelve 2-unit 4500-hp and three 1-unit 2250-hp passenger locomotives; latter will build fifty-nine 1500-hp road-switching units.

Chicago, Burlington & Quincy, twenty-three 1500-hp diesel-electric road switching units, to the Electro-Motive Division, General Motors Corp., La Grange, Ill.

Gulf-Mobile & Ohio, three 1600-hp diesel-electric road switching units, to American Locomotive - General Electric Companies, Schenectady, N. Y.

Lake Superior & Ishpeming, three 1000-hp diesel-electric switching units, to American Locomotive - General Electric Companies, Schenectady, N. Y.

Minneapolis & St. Louis, three 1000-hp, diesel-electric road switching units to American Locomotive - General Electric Companies, Schenectady, N. Y.

Missouri Illinois, one 1600-hp diesel-electric road-switching unit to American Locomotive-General Electric Companies, Schenectady, N. Y.,

St. Johnsbury & Lamoille County, one 600-hp diesel-electric switching unit, to General Electric Co., Schenectady, N. Y.

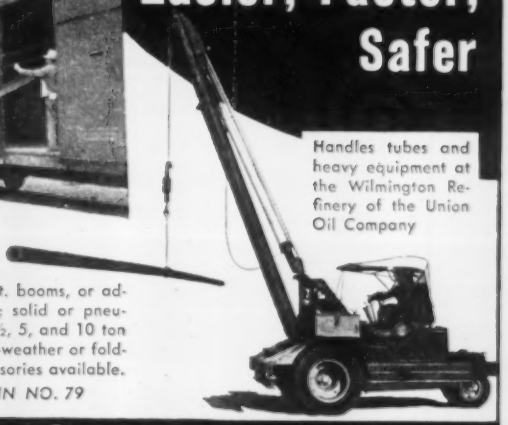
Union Pacific, 44 diesel-electric locomotives; thirty 1500-hp freight units and eight 2400-hp yard switchers to Electro-Motive Division, General Motors Corp., LaGrange, Ill.; six 1600-hp switching locomotives to Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

Wabash, 34 diesel-electric units, of which Electro-Motive Division, General Motors Corp., La Grange, Ill., will build ten 1500-hp road switching, five 1200-hp switching

Heavy Industries Use KRANE KAR SWING-BOOM MOBILE CRANE to Cut Costs by Handling Loads Easier, Faster, Safer

Stacking fittings at a Los Angeles Public Utility

Unloading boxcar at Southern Pacific's General Stores Dept.



Handles tubes and heavy equipment at the Wilmington Refinery of the Union Oil Company

Gas or diesel, 12 to 37 ft. booms, or adjustable telescopic booms; solid or pneumatic rubber tires. 1½, 2½, 5, and 10 ton cap. Buckets, magnets, all-weather or foldable tops, and other accessories available.

WRITE FOR BULLETIN NO. 79

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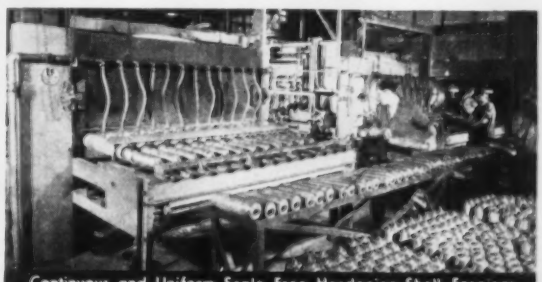

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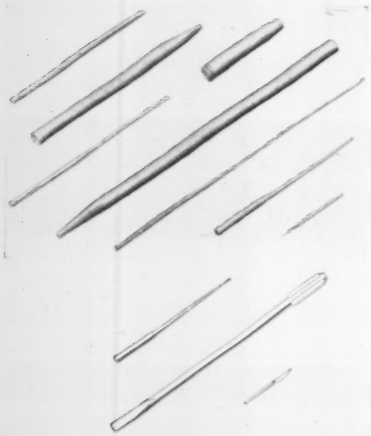

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locomotives, six 2-unit 3000-hp freight engines and one 2250-hp passenger locomotives; and General Motors Diesel Ltd., London, Ont., two 2-unit 3000-hp freight, one 1500-hp road-switching and one 800-hp switching locomotives.

METALLURGICAL COKE

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-15.00
Connellsville, foundry	17.00-18.00
New River, foundry	19.50
Wise county, foundry	15.95
Wise county, furnace	15.20

Oven Foundry Coke

Kearney, N. J., ovens	$22.75
Everett, Mass., ovens	
New England, del.	*24.80
Chicago, ovens	23.00
Chicago, del.	24.40
Terre Haute, ovens	22.50
Milwaukee, ovens	23.75
Indianapolis, ovens	22.75
Chicago, del.	26.28
Cincinnati, del.	25.73
Detroit, del.	26.71
Ironton, O., ovens	22.50
Cincinnati, del.	25.12
Painesville, O., ovens	24.00
Cleveland, del.	25.75
Erie, Pa., ovens	23.50
Birmingham, ovens	20.30
Birmingham, del.	21.69
Philadelphia, ovens	22.70
Neville Island, Pa., ovens	22.00
Swedeland, Pa., ovens	22.00
St. Louis, ovens	
St. Louis, del.	25.40
Portsmouth, O., ovens	22.50
Cincinnati, del.	25.12
Detroit, ovens	24.00
Detroit, del.	25.00
Buffalo, del.	26.75
Flint, del.	26.49
Pontiac, del.	25.42
Saginaw, del.	26.81

* Or within $4.15 freight zone from works.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite, mines	65.00

Manganese Ore

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00
South African Transvaal	
44% no ratio	$27.00-28.00
45% no ratio	30.00
48% no ratio	34.00-35.00
50% no ratio	28.00-28.50
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb. molbdenum content, mines	$1.00

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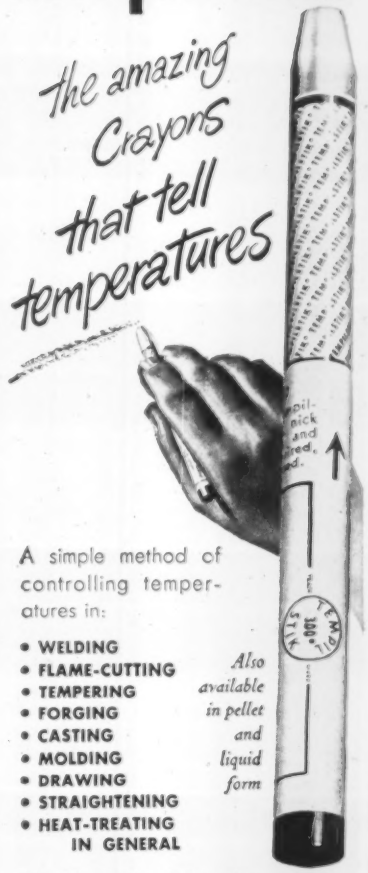
the amazing Crayons that tell temperatures



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Also available in pellet and liquid form

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Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000
250				

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

U. S. Steel Moving Offices

Purchasing offices of United States Steel were moved to the 12th floor of the new building at 525 William Penn Place, Pittsburgh. Purchasing offices of American Bridge Co. and National Tube Co. are on the same floor.

Other U.S. Steel offices which have moved to the new building include: Pittsburgh district sales of U.S. Steel Co., 9th floor; Coal Chemical Sales Division, U.S. Steel, 10th floor; Pittsburgh district operations, sales and traffic, American Steel & Wire Co., 9th floor; Pittsburgh district contracting department, marine and tower departments, American Bridge Co., 10th floor; Pittsburgh district sales and Christy Park sales, National Tube Co., 10th floor; Pittsburgh district sales and tubular department, Oil Well Supply Co., 10th floor; Pittsburgh district sales, Universal Atlas Cement Co., 10th floor; traffic department, U.S. Steel Co., 11th floor.

Read Standard Corp.

Standard Stoker Co. Inc., New York, and its Read Machinery division, York, Pa., changed its corporate name to Read Standard Corp. E. A. Turner is president.

Fairbanks Opens Office

Fairbanks, Morse & Co., Chicago, opened a new sales and service branch office at 3000 W. 17th St., Cleveland. The office is located in the company's recently completed $300,000 building which also houses a diesel repair shop, shop for repairing and rebuilding scales, large warehouse, repair parts department and display floor.

Graver Appoints Agent

Graver Water Conditioning Co., manufacturer of equipment for all water-treating processes, appointed Flagg, Brackett & Durgin Inc., Boston, as its New England representative.

Army Plans $3 Million Plant

A $3 million plant for production of supertropical bleach will be built by the Army near the government-owned Marshall plant at Natrium, W. Va. The contract for design and construction of the building has not been awarded. Supertropical bleach is used for decontamination purposes.

Furnace Firm Changes Hands

Fred C. Moore, a pioneer in the warm air heating and winter conditioning industry in Canada, disposed of his interests in the company which he founded, New Idea Furnaces Ltd., Ingersoll, Ont. A. Stuart Hallamore becomes general manager of the firm. He formerly was associated with Robertson-Irwin Ltd. and Steel Co. of Canada Ltd. Mr. Moore remains with New Idea Furnaces in an advisory capacity.

Hardinge To Cast Meehanite

Hardinge Co. Inc., New York, contracted with Meehanite Metal Corp., New Rochelle, N. Y., to produce Meehanite castings in its foundry at York, Pa. Hardinge manufactures heavy-duty equipment for the mining industry and products in the machinery field.

Cornell Expands Laboratory

Cornell Aeronautical Laboratory, Buffalo, plans expansion of its big research laboratory building. Work on the structure will be undertaken this summer. The laboratory is busy with government research and development projects.

Eastern Clay Opens Plant

Doubling of output, as well as an assurance against interruption of production, will result from the opening of a new plant by Eastern Clay Products Inc., Jackson, O. The new building will be devoted to production of Cupoline patching refractories. The varied products of the Cupoline group are used mainly in the Bondactor machine which utilizes mechanical means to patch and line cupolas and ladles. Plant No. 1 will be used to produce Cupoline products as well as the company's older line of foundry sands and clays.

Fire Damages Castings Plant

Fire gutted the plant of General Castings Ltd., Long Branch, Ont., Apr. 25, causing damage estimated at $30,000.

Machine Tool Builder Moves

Cleveland Automatic Machine Co., Cincinnati, moved its New York district office from Newark, N. J., to 75 S. Orange Ave., South Orange, N. J. R. T. Carroll is district manager; Charles Locey, service engineer.

Containers Firm Builds Plant

Valley Containers Inc. is constructing a paper products plant in Youngstown. This newly organized firm is a subsidiary of Ottawa River Paper Co., Toledo, O. Estimated cost is $250,000 for the building and $100,000 for equipment. A larger building is expected to be built later.

New Machine Shop To Open

O'Connell Co. purchased a building at Rapin, Doat and Genesee streets, Buffalo, for use as a machine shop. Assessed

Coil Spring says:

"HERE'S WHAT TO 'D.O.' IF YOU WANT GOOD SPRINGS"

• Call MIchigan 1-6318 Cleveland, today. We can deliver those springs exactly to your specifications or we can design the spring that will do your job. Our experience covers the widest variety of spring applications for every branch of industry. The time to get a quotation for "this spring" is right now.

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LANSDOWNE, Del. Co., PENNA.

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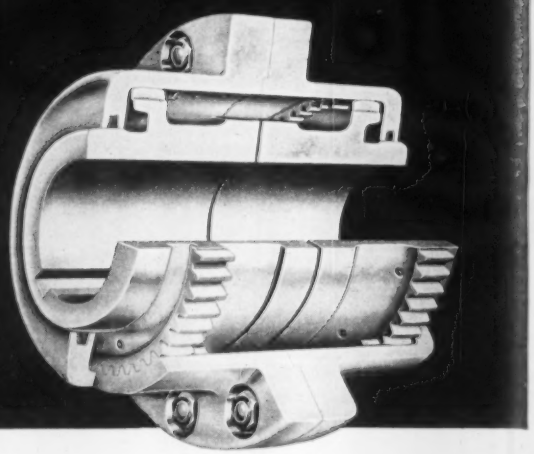

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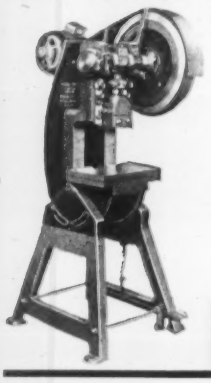

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15-TON POWER PRESSES

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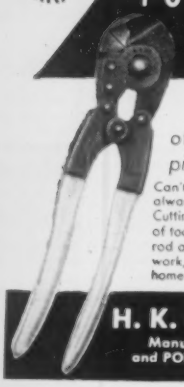
PORTER HANDKLIP 6A ANGULAR CUTTER
for CLOSE CUTTING
of soft wires, rods, bolts, form wires, cotter pins, hog rings, spurs on castings, etc.



Can't be beaten for close cutting in cramped quarters, with the work always in plain sight and the hand and wrist in comfortable position. Cutting edges offset at 45° angle from tool axis and 30° from plane of tool. Adjustable to compensate for wear on jaws. Indispensable for rod and wire mills, machine shops, garages, warehouses, mines, repair work, construction work, in sheet metal and refrigeration industries and home workshop. Ask your mill supply dealer.

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Manufacturers of PORTER CUTTERS, PORTER PRUNERS and PORTER-FERGUSON Auto Body and Fender Repair Tools

INTRODUCTION TO THE STUDY OF HEAT TREATMENT OF METALLURGICAL PRODUCTS
By Albert Portevin

Fundamental knowledge and essential principles of heat treatment of steel are presented in simple and understandable manner. Research engineers, metallurgical students and steel plant metallurgists engaged in metallurgical investigations and the heat treatment of ferrous and non-ferrous metals will find this book of inestimable value.

246 pages 4 tables
69 illustrations Price $5.00 Postpaid

THE PENTON PUBLISHING CO.
Book Department, 1213 W. 3rd St., Cleveland 13, O.

...ue of the building is $60,000.

Sylvania To Build Addition

Sylvania Electric Products Inc., New York, will spend $1 million to expand its chemical and tungsten plant at Towanda, Pa. The addition will about double the size of the present plant. Completion of the project is set for next fall.

Hayes Buys Bawden Machine

Canadian operations of Hayes Mfg. Corp., Grand Rapids, Mich., and its subsidiaries have been expanded and diversified as a result of the acquisition of the business and assets of Bawden Machine Co. Ltd., Toronto, Ont., manufacturer of mechanical, hydraulic and filter presses, rubber mill and plastic molding machinery, marine equipment and centrifugal pumps, among other products. Renamed Bawden Industries Ltd., the newly acquired company will complement the activities of Affiliated Engineering Ltd., Montreal subsidiary of Hayes' wholly-owned American Engineering Co., Philadelphia. Officers of Bawden Industries Ltd. now are: R. W. Clark, president; Edgar Washburn, vice president, who will supervise the Toronto operations; McKee Robison, secretary; Eugene H. Glaettli, treasurer.

Cannon Opens Plant in East

Cannon Electric Co., Los Angeles, opened a plant in East Haven, Conn., for engineering and design consultation services. E. C. Quackenbush heads the engineering department of the newly created Eastern Division. Robert J. Cannon, president, said that as soon as possible the division will add warehousing, assembly, subcontracting and eventually manufacturing space.

Sheet Metal Firm Expands

William H. Berger & Sons, Baltimore, engaged in sheet metal work, is equipping about 2000 additional square feet for heavy gage operations.

American Electronics Mfg.

American Electronics Mfg. Co. equipped about 6000 square feet at 410 W. Conway St., Baltimore, for making industrial test equipment and other electronic items.

Follansbee Opens Warehouse

An expanse about equal to that required for a major league baseball field is covered by Follansbee Steel Corp.'s new Pittsburgh warehouse. Its floor space represents an increase of 300 per cent over the storage area in the firm's former warehouse in that city while storage capacity is 600 per cent larger. Hot-rolled steel plates, bars and shapes have been added to the warehouse line, which includes stainless steel sheets, plates and bars; cold-rolled, galvanized and corrugated sheets; perforated and expanded metal; tin plate; sheet copper; heating, roofing and sheet metal supplies. Oxygraph shears and cutting saws are the principal metal cutting machines.

Gerotor-May To Build Office

Gerotor-May Corp., Baltimore, manufacturer of domestic oil heating equipment, hydraulic pumps and motors, etc., awarded a contract for an office building on its present plot and will use the existing office space for manufacturing operations.

Deakin Moves to Jamaica

J. Arthur Deakin & Son moved to its newly enlarged showroom and offices at 150-28 Hillside Ave., Jamaica 2, N. Y. This company is the representative in this country for the English firm of George H. Alexander Machinery Ltd. and its subsidiary, Precision Grinding Ltd.

Refractories Firm Expands

General Refractories Co., Philadelphia, is building a $3 million plant at Warren, O. All types of fire brick will be made in the plant when it is finished in about 14 months. The company will build a $1 million plant in Los Angeles. Facilities for manufacture of unburned refractories will increase West Coast capacity by 100 per cent.

C. F. Braun Adds Facilities

C. F. Braun & Co., Alhambra, Calif., is spending $2.5 million for new facilities. Being added are a communications center, enlarged restaurant, increased research facilities and offices. The company manufactures refinery apparatus for the petroleum and chemical industries.

Majestic Radio Moves Office

Majestic Radio & Television, division of Wilcox-Gay Corp., moved its factory sales, advertising and general offices to 385 Fourth Ave., New York. Main purchasing offices, production office and service department will be retained at the Majestic factory at 70 Washington St., Brooklyn 1, N. Y.

Mill Expansion Progresses

With foundation work completed, some steel now is being put into place for the huge addition to Columbia Steel Co.'s sheet and tin mill at Pittsburg, Calif. The project is about 20 per cent completed. A late summer date is promised for the final touches. The multi-million dollar enlarge-

MW POWER PRESS BRAKE

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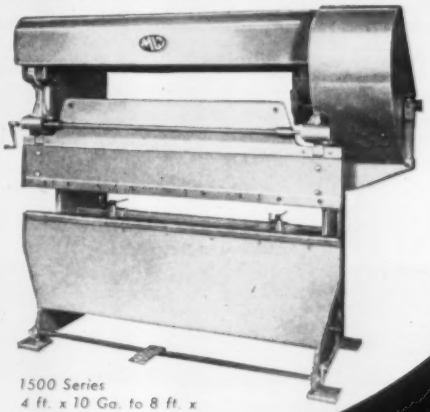

1500 Series
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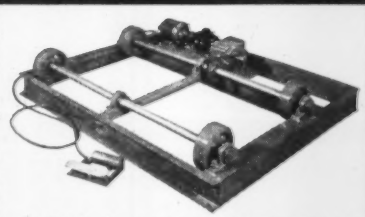

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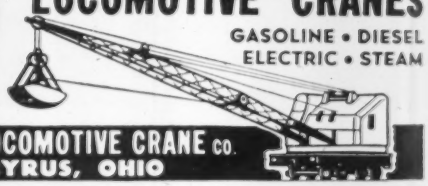

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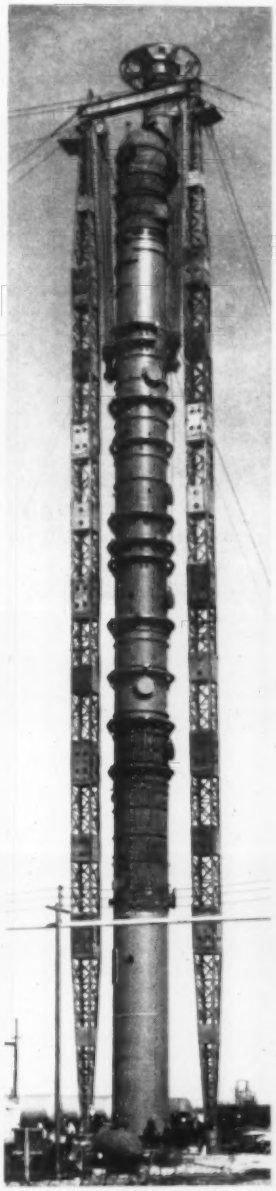
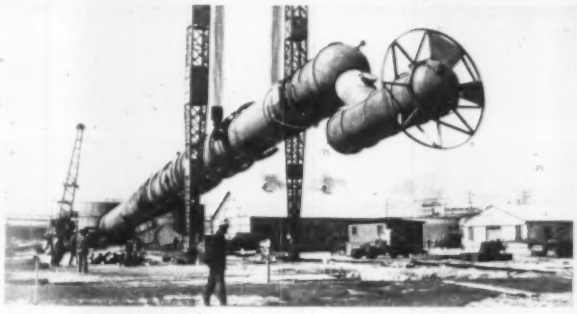
Ships First Bomber Parts

Kaiser-Frazer Corp. has begun shipments of components for the Navy's Lockheed Neptune patrol bombers from its aircraft division at Oakland, Calif. First shipments consisted of center section flaps on which production began Mar. 19. K-F is constructing a building which will double the present aircraft manufacturing space at its Oakland division. Scheduled for completion in June, the new facilities will be used for production of fuselage waist sections.

Plans $2 Million Gear Plant

Plans for a $2 million gear manufacturing plant to be located at Belmont, Calif., were announced by Western Gear Works, Lynwood, Calif. The plant, scheduled to be completed by late summer, will be devoted to the manufacture of special gear drives for new land-type vehicles in the Army's land tank program.





SKY HIGH: Erected in one piece by Austin Construction Co., this 207-foot Hypersorber towers over the Midland, Mich., plant of Dow Chemical Co. Built by Foster Wheeler Corp., Carteret, N. J., the Hypersorber's purpose is to separate light hydrocarbon gases. The finished tower will weigh about 500 tons. A pair of 190-foot "stiff legs", two hoisting steam engines, eight sheaved blocks and 17 one-inch steel cables were used in erection

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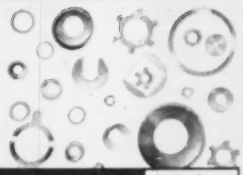

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